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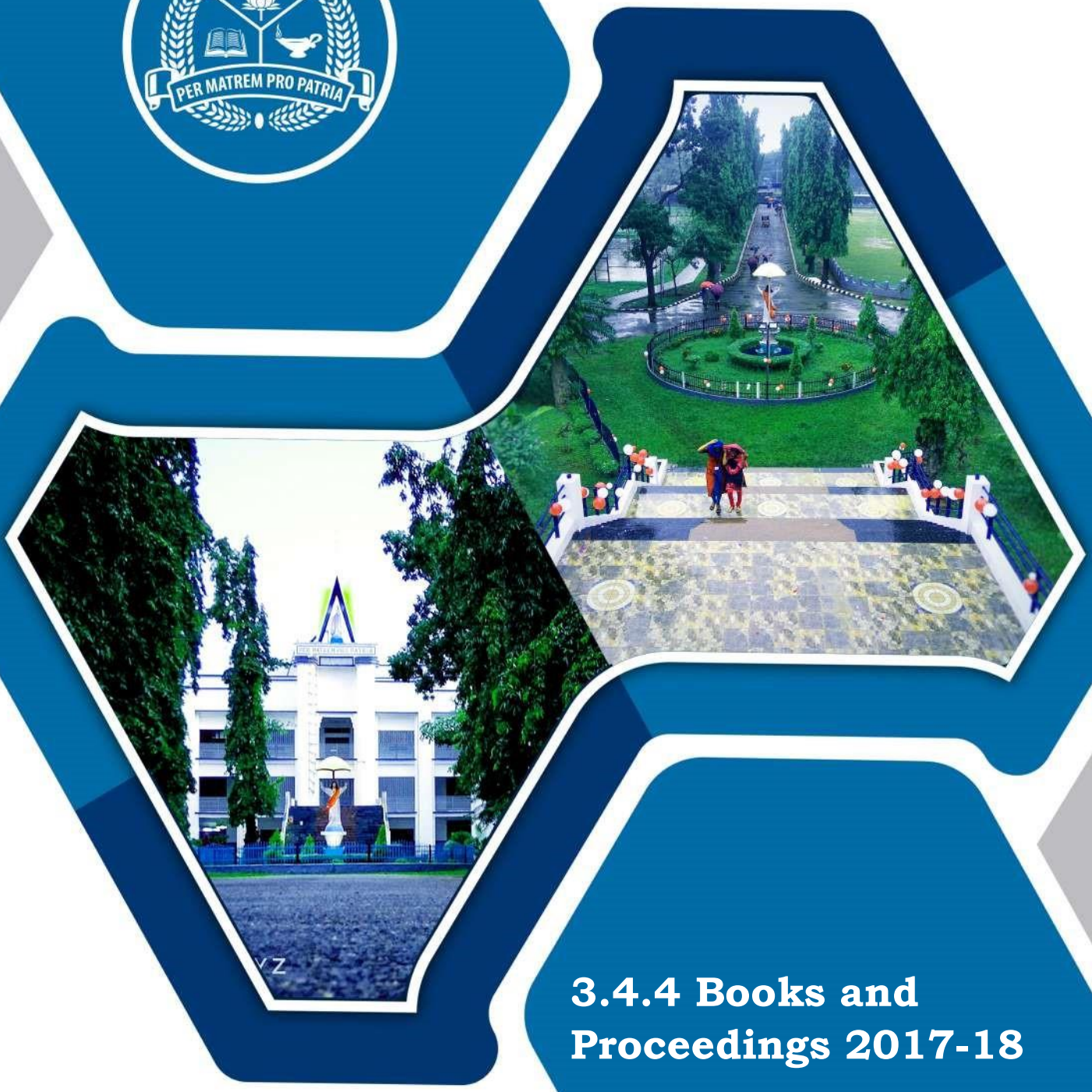

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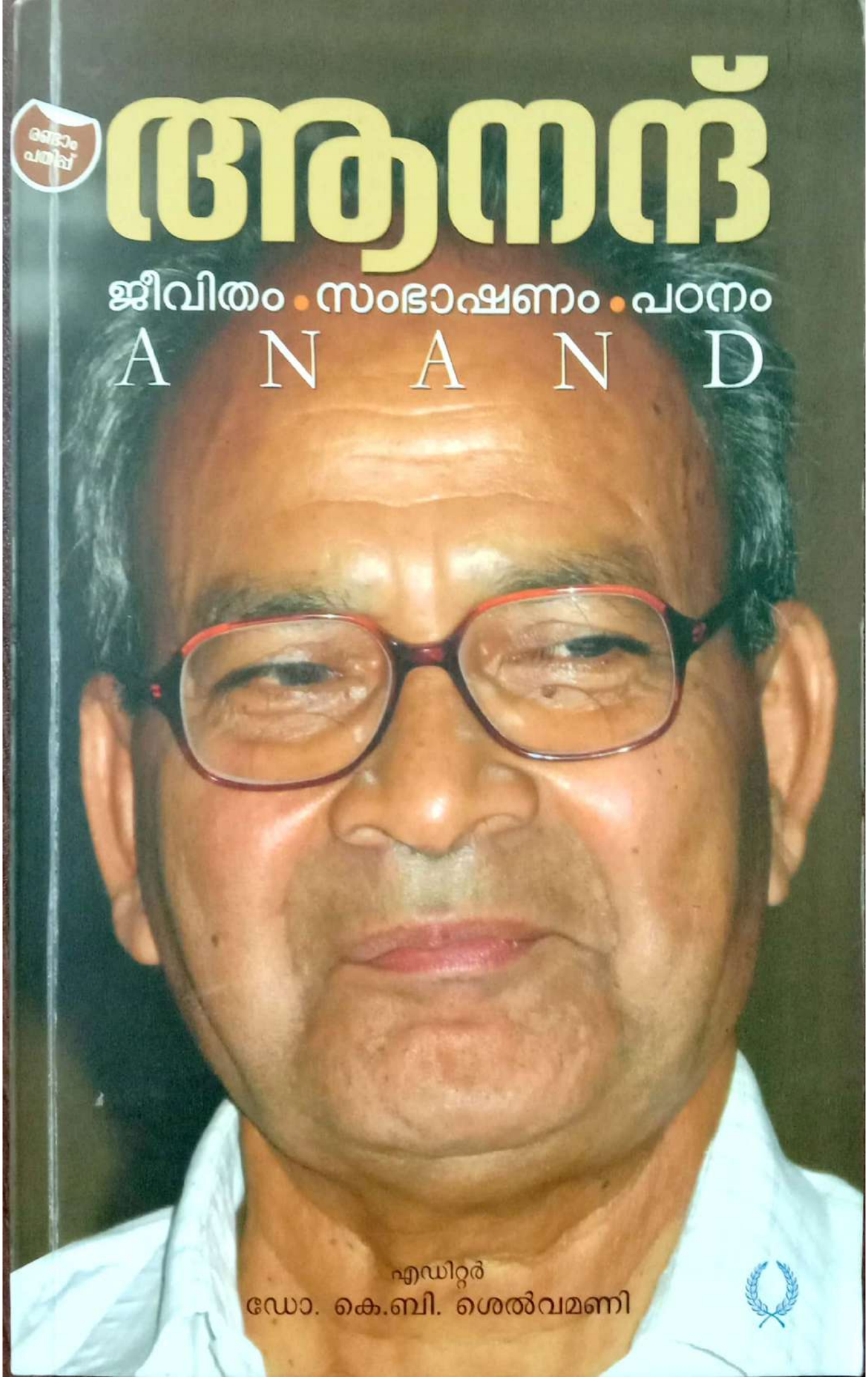

ആനന്ദ്

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എഡിറ്റർ

ഡോ. കെ.ബി. ശെൽവമണി

ഒലിവ്

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ഒരാളുടെ ഇച്ഛാശക്തിയുടെയും ദർശനശേഷിയുടെയും പ്രേരണയാൽ മനുഷ്യജീവിതദർശനമെന്ന വിസ്തൃതമൈതാനത്തിലേക്ക് തുറന്നിടാൻ പാകത്തിൽ രൂപപ്പെടുത്തിയ ദശലക്ഷം ജാലകങ്ങളുടെ സാദ്ധ്യത നോവൽസൗധത്തിനുണ്ടെന്ന് പ്രസിദ്ധ നോവലിസ്റ്റായ ഹെൻറി ജയിംസ് അഭിപ്രായപ്പെടുന്നുണ്ട്. ഇത്രമേൽ സ്വാതന്ത്ര്യവും ഇത്രമേൽ എഴുത്തുകാരന്റെ പ്രതിഭയ്ക്ക് വഴങ്ങിക്കൊടുക്കുന്നതുമായ മറ്റൊരു സാഹിത്യരൂപമില്ല. നോവൽ എന്ന സാഹിത്യരൂപം എഴുത്തുകാരനു നൽകുന്ന ഈ സ്വാതന്ത്ര്യംതന്നെയാണ് കലാമൂല്യമില്ലാത്ത നോവലുകളുടെ സൃഷ്ടിക്ക് വഴിതെളിക്കുന്നത്. കലാസൃഷ്ടിയെ സംബന്ധിക്കുന്ന ഈ സ്വാതന്ത്ര്യത്തിന്റെ തീവ്രവേദനയും ഹർഷോന്മാദവും എന്താണെന്നറിഞ്ഞുകൂടാത്തവർ രചിക്കുന്ന നോവലുകൾ ഒരേസമയം ആത്മഹത്യയും കൊലപാതകവുമാണ്. ഒരു ചീത്ത നോവലിന്റെ സൃഷ്ടിയിലൂടെ എഴുത്തുകാരൻ സ്വയം നശിപ്പിക്കുന്നു. വായനക്കാരന്റെ സൗന്ദര്യബോധത്തെ ക്രൂരമാംവിധം ഇത്തരം നോവലുകൾ കൊലചെയ്യുന്നു. നമ്മുടെ നോവൽസാഹിത്യത്തിൽ നടക്കുന്ന ഈ ഭീകരപ്രവർത്തനങ്ങളുടെ നിരക്ക് അമ്പരപ്പിക്കുംവിധം വർദ്ധിച്ചു വരുന്നതു കണ്ട് ഭയവിഹ്വലരായിരുന്നവർക്ക് കിട്ടിയ മഹത്തായ ഒരാശ്വാസമാണ് ആനന്ദിന്റെ 'ആൾക്കൂട്ടം' എന്ന നോവൽ.

ആധുനിക ജീവിതത്തിന്റെ ദാർശനികപ്രശ്നങ്ങൾ മനസ്സിലാക്കിയ ഒരു നോവലിസ്റ്റാണ് ആനന്ദ്. മഹാവനം പോലെയുള്ള നഗരത്തിൽ ഭക്ഷണത്തിനും തണലിനുംവേണ്ടി അലഞ്ഞുനടന്ന കുറെ കഥാപാത്രങ്ങളുടെ അസ്ഥിരവും ഏകാന്തവുമായ ജീവിതത്തിന്റെ പ്രകാശനത്തിലൂടെയാണ് ഈ കാലഘട്ടത്തിന്റെ ദാർശനികപ്രശ്നങ്ങൾ ചിന്തകനായ നോവലിസ്റ്റ് അവതരിപ്പിക്കുന്നത്. ചിന്തകൻ കലാകാരനാകുമ്പോൾ അയാളെ സംബന്ധിച്ചിടത്തോളം ദാർശനികപ്രശ്നങ്ങൾ, അമൂർത്ത ധാരണകളെക്കുറിച്ചുള്ള വിരസമായ ചിന്തകളല്ല, മനുഷ്യന്റെ അവസ്ഥയെ അതിന്റെ സമഗ്രതയിൽ മനസ്സിലാക്കാനുള്ള സംരംഭമാണ്. തത്വചിന്തയുടെ അന്തരീക്ഷം നിറഞ്ഞുനിൽക്കുന്ന ആൾക്കൂട്ടം എന്ന നോവൽ ആസ്വദിക്കുന്നതിന് ഈ

അധികാരസീമകളിലെ സ്വത്വരാഷ്ട്രീയം

ഡോ.എം ആർ ഷെല്ലി

എഴുത്ത് തദനുസരണമായ വായന ഇവ ഗൗരവതമവും ധൈഷണികവുമായ ഒരു പ്രക്രിയയുടെ ഭാവദ്വന്ദ്വങ്ങളാണെന്നു മലയാളിയെ ബോധ്യപ്പെടുത്തിയ എഴുത്തുകാരിൽ പ്രഥമഗണനീയനാണ് ആനന്ദ്. സമകാലിക രാഷ്ട്രീയ സാംസ്കാരിക മേഖലകളെ മനുഷ്യന്റെ സ്വത്വബോധത്തോടു ചേർത്തുവയ്ക്കുകയും ധൈഷണികമായ ഒരു പരിപ്രേക്ഷ്യത്തിൽ നിന്നുകൊണ്ട് വ്യക്തിഗതമായ സംത്രാസങ്ങളെയും ചോദനകളെയും അധികാരത്തിന്റെ ആശയലോകത്തിലേയ്ക്ക് താത്ത്വികവും താർക്കികവുമായ സൂത്രസഞ്ചയങ്ങളിലൂടെ സുദൃഢമായി സന്നിവേശിപ്പിക്കുകയും ചെയ്ത സർഗ്ഗചേതനയ്ക്കുടമയാണിദ്ദേഹം. ഈ ഭരണകൂടം വ്യക്തിയുടെ ജീവിതത്തിൽ ഇടപെടുന്നതെങ്ങനെയെന്നും ഈ ഇടപെടലുകളുടെ പരിക്രമണപഥം എന്തായിരിക്കണമെന്നുമുള്ള ഒരു ദർശനസംസ്കാരം ആനന്ദ് മലയാളത്തിൽ രൂപപ്പെടുത്തി.

"ഓരോ ജനതയ്ക്കും അതിന്റെതായുള്ള സ്വത്വം സംരക്ഷിക്കാനുള്ള അവകാശമുണ്ട്. എന്തുഫലം ചെയ്താലും എന്തു സ്വഭാവമായാലും ഇതിനെല്ലാം സൗകര്യമൊരുക്കേണ്ടത് ഒരു വിശാല മനസ്സാണ്. ഞാൻ ഒരു ജനതയുടെയും മതത്തിന്റെയും സ്വത്വത്തിനെതിരല്ല. പക്ഷേ ഈ അന്വേഷണം പരസ്പരം കൂട്ടിമുട്ടുകയും രക്തപങ്കിലമാവുകയും അക്രമാസക്തമാവുകയും ചെയ്യുമ്പോൾ അതിനെ തടയേണ്ടതുമുണ്ട്. (1) സ്വത്വാന്വേഷണത്തിന്റെ റൂട്ട് മാപ്പ് രൂപപ്പെടുത്തിയ ഒരു ഡിസൈറായി ആനന്ദിവിടെ മാറുന്നു. രക്തം തളം കെട്ടികിടക്കുന്ന, അധികാരമാലിന്യം പുരണ്ട, ഓക്കാനത്തിന്റെ ക്ലാവു മണം ഉദ്വമിപ്പിക്കുന്ന കറുത്ത വഴികളിൽ നിന്ന് ദിശാവ്യതിയാനം ആവശ്യപ്പെടുന്ന ഒരു പ്രവാചകസാന്നിധ്യം ആനന്ദിന്റെ ഓരോ കൃതിയിലും മലയാളി അനുഭവിച്ചറിഞ്ഞിട്ടുണ്ട്.

ആനന്ദ്

ജീവിതം സംഭാഷണം പഠനം

പ്രമേയത്തിലും ആഖ്യാനത്തിലും എന്നും സവിശേഷത പുലർത്തുകയും രാഷ്ട്രീയ നിലപാടുകളിൽ ഉറച്ചു നിൽക്കുകയും എഴുത്തിന്റെ ഏറ്റവും ശക്തമായ കാതൽ രാഷ്ട്രീയം തന്നെയാണെന്ന് വിശ്വസിക്കുകയും ചെയ്യുന്ന എഴുത്തുകാരന്റെ ജീവിതവും സംഭാഷണവും പഠനവും. ചരിത്രമന്വേഷിക്കുന്നവർക്ക് ആനന്ദിന്റെ കൃതികളിലെ നിലപാടുകളും ഇന്ത്യൻ ജീവിതവും ഈ പുസ്തകത്തിൽ നിന്നും വായിച്ചെടുക്കാനാവും.

എഡിറ്റർ

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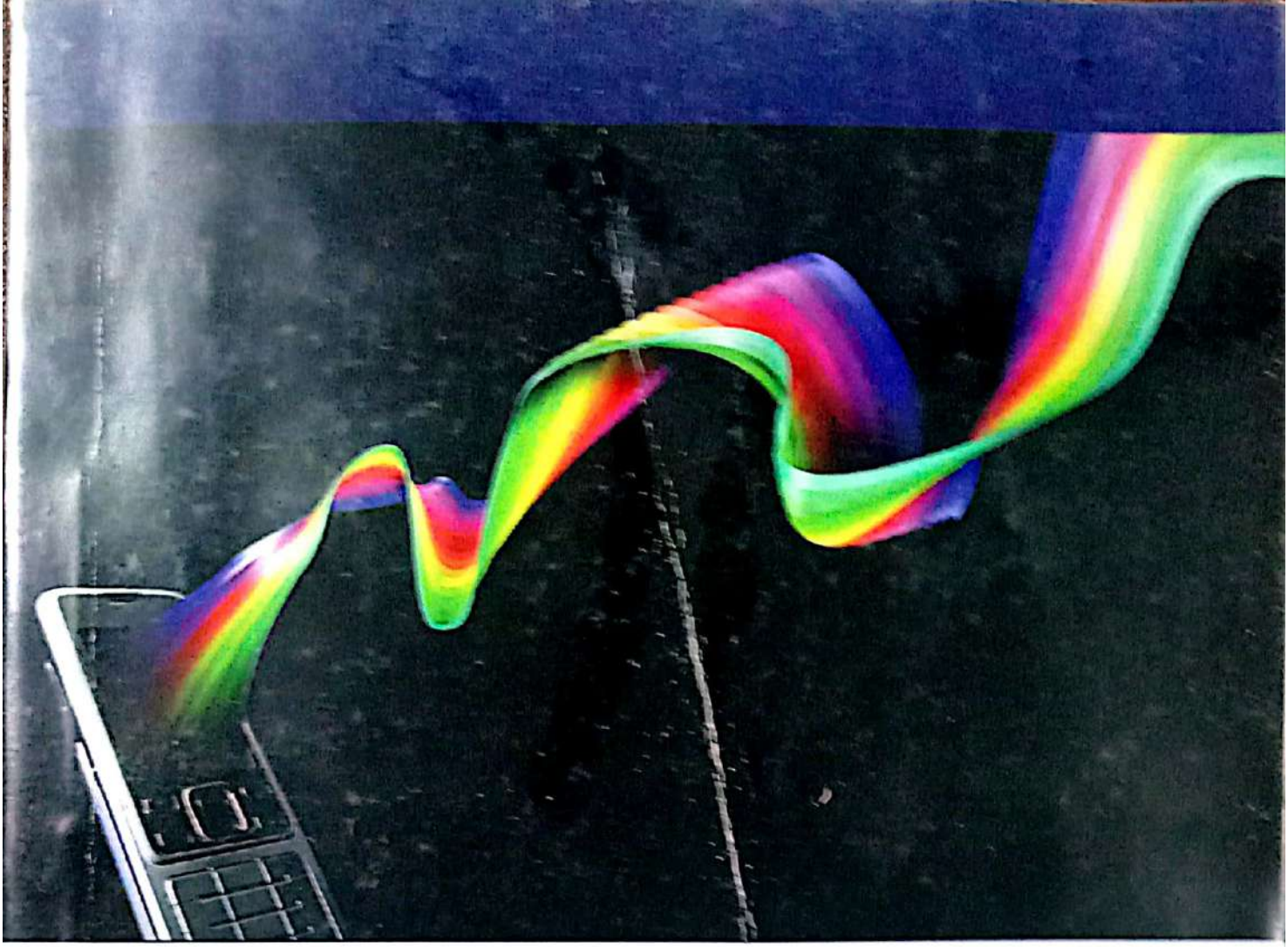

Bindhu Christopher

Estimation of effective dose of radiation from Wi-Fi to human body

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Chapters

CHAPTER 1

INTRODUCTION

After the advent of cell phone era the intensity of radio frequency pollution has increased may fold. Recently the main concern issue of scientific world is cell phone radiation. Nowadays there is some awareness about the problems and health risk associated with mobile phone radiation and Wi-Fi radiation. But the magnitude of danger can be mush overwhelming than anticipated. Slow and long term use of cell phone and Wi-Fi for long hours every day

'Estimation of effective dose of radiation from Wi-Fi to human body' is a well organized book gives the knowledge about experimental explanation of Wi-Fi radiation in the near field area. Wi-Fi routers, wireless laptops and tablet computers in schools and colleges constantly emit pulsed microwave radiation. According to scientific reviews this type radiation can cause major health hazards like brain cancer, DNA damage and infertility. In the first chapter a wide knowledge about the scientific experiments reviewed. Later the author describes an experiment to estimate the SAR values for different tissues in our body from Wi-Fi radiation. The experiment is repeated for different Wi-Fi sources and results are extended to different human body systems.

Ms.Bindhu Christopher working as an assistant professor on contract in Fatima Mata National College,Kollam,Kerala,India. She published several books in physics for comparative examinations and scientific research. In this book the author gives the knowledge about experimental explanation of Wi-Fi radiation.

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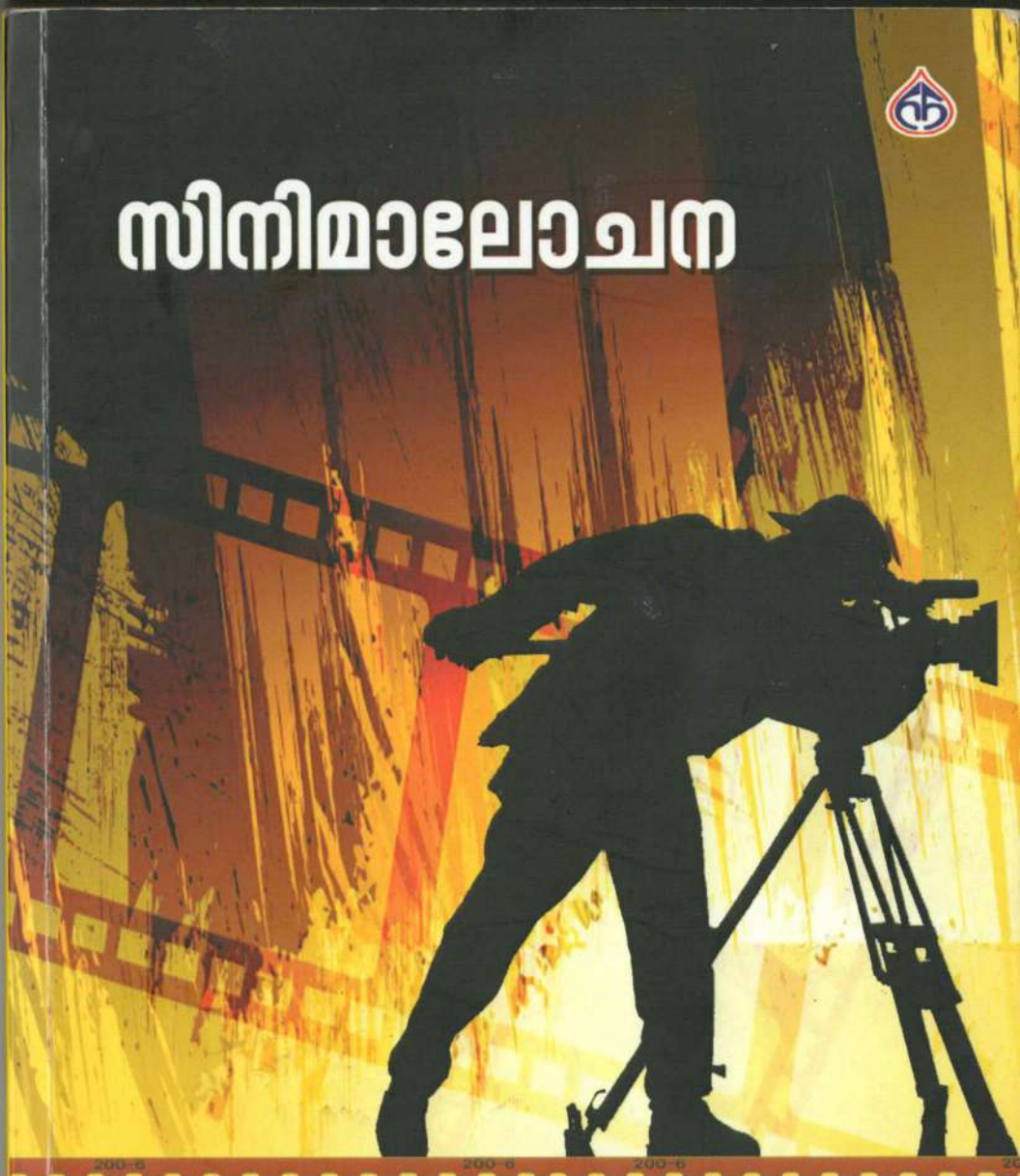

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പെൺകുട്ടിയുടെ കഥ പറഞ്ഞ മിലി, അഗ്നിശമന സേനാംഗങ്ങളുടെ കഥ പറഞ്ഞ ഫയർമാൻ, ട്രെയിൻ യാത്രയ്ക്കിടെ ഒരു സെൽഫി കൊണ്ട് ഒരു യുവാവിന്റെ ജീവിതം മാറുന്ന പ്രമേയവുമായി ഒരു വടക്കൻ സെൽഫിയും മലയാള സിനിമയിൽ തരംഗം സൃഷ്ടിച്ച പ്രേമവും ഇരവഴഞ്ഞിപ്പുഴയിൽ മറഞ്ഞ മൊയ്തീന്റെ ഓർമ്മകളിൽ ഇന്നും ജീവിക്കുന്ന കാഞ്ചനമാലയുടെ കഥ അഭ്രപാളിയിലെത്തിച്ച എന്നു നിന്റെ മൊയ്തീൻ പ്രവാസി ദുരിതങ്ങൾ പറയുന്ന പത്തേമാരി സ്ത്രീപക്ഷ സന്ദേശവുമായി ഇറങ്ങിയ റാണി പദ്മിനി, ബാലവേല പ്രമേയമാക്കിയ ഒറ്റാൽ എന്നിങ്ങനെ പ്രമേയവൈവിധ്യവുമായി മുന്നോട്ടു പോകുന്നു മലയാള സിനിമ.

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നൂതനാവിഷ്ക്കാര രീതി - പുതുതലമുറ സിനിമകളിൽ

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കുറേ വർഷങ്ങളായി ആവർത്തന വിരസതയിൽ കുരുങ്ങിക്കിടന്ന മലയാളസിനിമയിൽ ഒരു പുതിയധാര ഉദയം കൊണ്ടിരിക്കുന്നു. ദൃശ്യശൈലീപരവും പ്രമേയപരവുമായ വ്യത്യസ്തതകൾ വ്യക്തമായിത്തന്നെ പ്രകടിപ്പിക്കുന്നവയാണ് 'ന്യൂ ജനറേഷൻ' എന്ന ഓമനപ്പേരിൽ അറിയപ്പെടുന്ന ചിത്രങ്ങൾ പലതും. ലോക സിനിമയിൽ സംഭവിച്ചിട്ടുള്ള മാറ്റങ്ങളുടെ ഗുണവശങ്ങളെ ഈ ചിത്രങ്ങൾ പിൻപറ്റുന്നുണ്ട്. താരങ്ങളെ, താരവ്യന്ത്തെ നിരാകരിക്കുകയോ താരങ്ങളുടെ താര പരിവേഷത്തെ നിഷേധിക്കുകയോ ചെയ്യുന്ന കഥയും കഥാപാത്രങ്ങളും; നായകൻ, നായിക, വില്ലൻ, ഉപനായിക തുടങ്ങിയ സാമ്പ്രദായിക ജനപ്രിയരീതികളും ജനപ്രിയ ഫോർമുലയിൽ പടച്ചെടുത്ത ഇതിവൃത്തവും ആഖ്യാനരീതിയും ഉപേക്ഷിക്കുക, തീർത്തും ലളിതമെന്നു തോന്നാവുന്ന ഇതിവൃത്തങ്ങളിലൂടെ സമകാലിക സംഭവവികാസങ്ങളെ രേഖപ്പെടുത്തുകയും നിത്യജീവിതത്തോട് അടുത്തു നിൽക്കുന്നതും മധ്യവർഗ്ഗജീവിതത്തെ അടയാളപ്പെടുത്തുന്നതുമായ പ്രമേയങ്ങളെ ചിത്രീകരിക്കുക, സംഘട്ടനങ്ങളെയും ഇടിവെട്ട് സംഭാഷണങ്ങളെയും മരംചുറ്റി പാട്ടുകളെയും വേണ്ടെന്നു

വെക്കുക തുടങ്ങി പല പ്രത്യേകതകളും ന്യൂ ജനറേഷൻ സിനിമകൾപേറുന്നുണ്ട്.

ആഖ്യാനഘടനയിൽ ഇത്തരം ചിത്രങ്ങൾ കൊണ്ടുവന്ന മാറ്റങ്ങൾ ഏറെ ശ്രദ്ധിയ്ക്കേണ്ടതാണ്. മൾട്ടിപ്പിൾ നരേറ്റീവ്സ് (ട്രാഫ്ക്, ഫ്രൈഡേ, ഈ അടുത്തകാലത്ത്, ഹോട്ടൽ കാലിഫോർണിയ തുടങ്ങിയവ) ആകസ്മികതയിലുള്ള ഊന്നൽ (ഹൗ ഓൾഡ് ആർ യു, ഞാൻ സ്റ്റീവ് ലോപ്പസ്, ട്രാഫ്ക്, ചാപ്പാകുരിശ് തുടങ്ങിയവ), മുൻകാല ചിത്രങ്ങളുടെ റഫറൻസ് (ട്രിവാൻഡ്രം ലോഡ്ജ്, ബ്യൂട്ടിഫുൾ, തട്ടത്തിൻ മറയത്ത്, നത്തോലി ഒരു ചെറിയ മീനല്ല) തുടങ്ങിയവ അതിന്റെ അഭിവാജ്യഘടകങ്ങളായി ഇത്തരം ചിത്രങ്ങളിൽ പ്രത്യക്ഷപ്പെടുന്നുണ്ട്.

"സൂപ്പർതാരാനന്തര" ചിത്രങ്ങളാണ് ഇവയെന്ന് വളരെ വാചാലമായിത്തന്നെ പ്രഖ്യാപിക്കുന്നുണ്ട്. 'ട്രാഫിക്കിൽ ഒരു സിനിമാതാരം തന്നെ കഥാപാത്രമായി വരുന്നു, 'ചാപ്പാകുരിശി'ൽ മമ്മൂട്ടിയെക്കുറിച്ച് മലബാറുകാരനായ അൻസാരിയും അവന്റെ കാമുകി നഫീസയും നടത്തുന്ന പരാമർശങ്ങൾ/ പോസ്റ്ററുകൾ, 'തട്ടത്തിൻ മറയത്തിൽ' മജീദ് രാവണപ്രഭുവിലെ കാർത്തികേയന്റെ ഡയലോഗിന് പാരഡി ചമയ്ക്കുന്നത്, മുൻകാല ചിത്രങ്ങളുടെയും പാട്ടുകളുടെയും റഫറൻസ് (ബ്യൂട്ടിഫുൾ, ട്രിവാൻഡ്രം ലോഡ്ജ്, തട്ടത്തിൻ മറയത്ത്, നത്തോലി ഒരു ചെറിയ മീനല്ല) എന്നിവയുടെയൊക്കെ സാന്നിധ്യം മലയാള സിനിമയ്ക്കകത്ത് ഈ ചിത്രങ്ങൾ സ്വീകരിക്കുന്ന സ്വന്തം നിലപാടുകളെ സൂചുപ്പിക്കുന്നു. 'ഈ അടുത്ത കാലത്ത്' എന്ന സിനിമയിൽ ഒരുപിടികൂടി കടന്ന് 'പ്രണയം' എന്ന സിനിമയെക്കുറിച്ച് ഒരു പോലീസുകാരൻ തന്റെ സഹപ്രവർത്തകനോട് നടത്തുന്ന പരിഹാസരൂപേണയുള്ള പരാമർശങ്ങൾ എന്ന തലത്തിലേക്കെത്തുന്നു.

നാഗരികമാണ് ന്യൂജനറേഷൻ സിനമകളുടെ ആഖ്യാനലോകവും പരിസരവും. നഗരത്തിലെ ഏറ്റവും സമ്പന്നമായ ഇടത്തോടൊപ്പം ചേരിയെ അവതരിപ്പിക്കാനും രണ്ടിടത്തെയും ജീവിതത്തിന്റെ വൈജാത്യങ്ങളിൽ ഊന്നാനും അവ ശ്രമിക്കു

ന്നുണ്ട്. ചേരികൾ മുമ്പും ഇന്ത്യൻ സിനിമകളിൽ പ്രത്യക്ഷപ്പെട്ടിട്ടുണ്ട്. അധോലോകത്തിന്റെയോ തികഞ്ഞ വറുതിയുടെയോ രൂപത്തിലായിരുന്നു ആഖ്യാനത്തിൽ ഇടം കണ്ടെത്തിയിരുന്നത്. എന്നാൽ 'സ്ലം ഡോഗ് മില്യനയർ' എന്ന ചിത്രം ചേരിക്ക് പുതിയ സൗന്ദര്യവും ആഖ്യാനസാധ്യതകളും നൽകി. ഈ ചിത്രത്തിൽ നഗരം എന്നത് അവിടെ വസിക്കുന്ന ഏതൊരു വ്യക്തിയ്ക്കും തുല്യമായ അവസരം നൽകുന്ന മായികമായ ഒരു ഇടമായി പ്രത്യക്ഷപ്പെടുന്നു. കഴിവും ആകസ്മികതയും കൈകോർക്കുകയാണെങ്കിൽ ഒരാൾക്ക് നഗരത്തിലെ കോടിപതിയാകാം; ചേരിജീവിതം നൽകിയ തിക്താനുഭവങ്ങൾ ടെലിവിഷൻ ഷോയിൽ മുന്നേറാനുള്ള 'അറിവു'കളായി മാറാം. സാമൂഹികതയുടെയും സമ്പദ്വ്യവസ്ഥയുടേതുമായ എല്ലാവിധ കെട്ടുപാടുകളിൽനിന്നും മാറി വ്യക്തിയ്ക്ക് തന്റെ ധീരതയും വൈഭവവും കൊണ്ട് എല്ലാവിധ തടസങ്ങളെയും മറികടന്ന് തന്റെ പ്രണയസാഫല്യത്തിലേക്ക് കുതിക്കാനും കഴിയും.

നായകനെ ഓർമയിലേക്കും സമൂഹത്തിലേക്കും തിരിച്ചെത്തിക്കുന്ന ഒരു ആഖ്യാനതന്ത്രമായാണ് 'ആകസ്മികത'യെ പല പ്പോഴും സിനിമകളിൽ ഉപയോഗിച്ചിരുന്നത്. കുട്ടിക്കാലത്ത് വേർപെട്ടു പോയ സഹോദരങ്ങൾ പരസ്പരം തിരിച്ചറിയുന്നു. ചിതറിപ്പോയ കുടുംബം ഒത്തുചേരുന്നു എന്നൊക്കെയുള്ള രീതിയിൽ അത് വ്യക്തിയെ സമൂഹത്തിലേക്കും അയാളുടെ സാമൂഹികതയിലേക്കും തിരിച്ചെത്തിക്കുന്ന/തിരിച്ചറിയുന്ന ഒരു സന്ദർഭം ആയിരുന്നു. എന്നാൽ ന്യൂ ജനറേഷൻ സിനിമകളിൽ ആകസ്മികതനായകനെ/വ്യക്തിയെ എതിർദിശയിലേക്കാണ് കൊണ്ടുപോകുന്നത്. അയാൾക്ക് അതോടെ സ്വന്തം സമൂഹത്തിന്റെ /സാമൂഹികതയുടെ ഭാരത്തിൽ നിന്ന് സ്വാതന്ത്ര്യം ലഭിക്കുന്നു. ആകസ്മികതകൾ പുതിയലോകം തുറക്കാനുള്ള താക്കോൽ അയാൾക്ക് നൽകുന്നു. 'ചാപ്പാ കുരിശി'ലെ അൻസാരിയുടെ കൈയിലെത്തിച്ചേരുന്ന ഫോൺ പുതിയ അധികാര പ്രയോഗങ്ങളുടെയും ലോകത്തെ നിയന്ത്രിക്കാനുള്ള സാധ്യത

സിനിമാലോചന

മലയാള സിനിമാനുഭവം ഒരു പഠനം

എഡിറ്റർ: രാജി. ജെ

ചലച്ചിത്രം അടിസ്ഥാനപരമായി ദൃശ്യകലാരൂപമാണ്. ശബ്ദവും ഇതരഘടകങ്ങളും അതിന്റെ അഭിഭാജ്യ വിഭവങ്ങൾ ആണെങ്കിലും ദൃശ്യബിംബത്തെ പൊലിപ്പിക്കുകയാണ് അതിന്റെ ലക്ഷ്യം. അത്തരത്തിൽ ദൃശ്യ സാധ്യതകളുടെ വൈവിധ്യം മലയാള ചലച്ചിത്രരംഗം എപ്രകാരം ആവിഷ്കരിച്ചിട്ടുണ്ട് എന്ന കണ്ടെത്തലാണ് ഈ പഠനങ്ങൾ വിശകലനം ചെയ്യുന്നത്.

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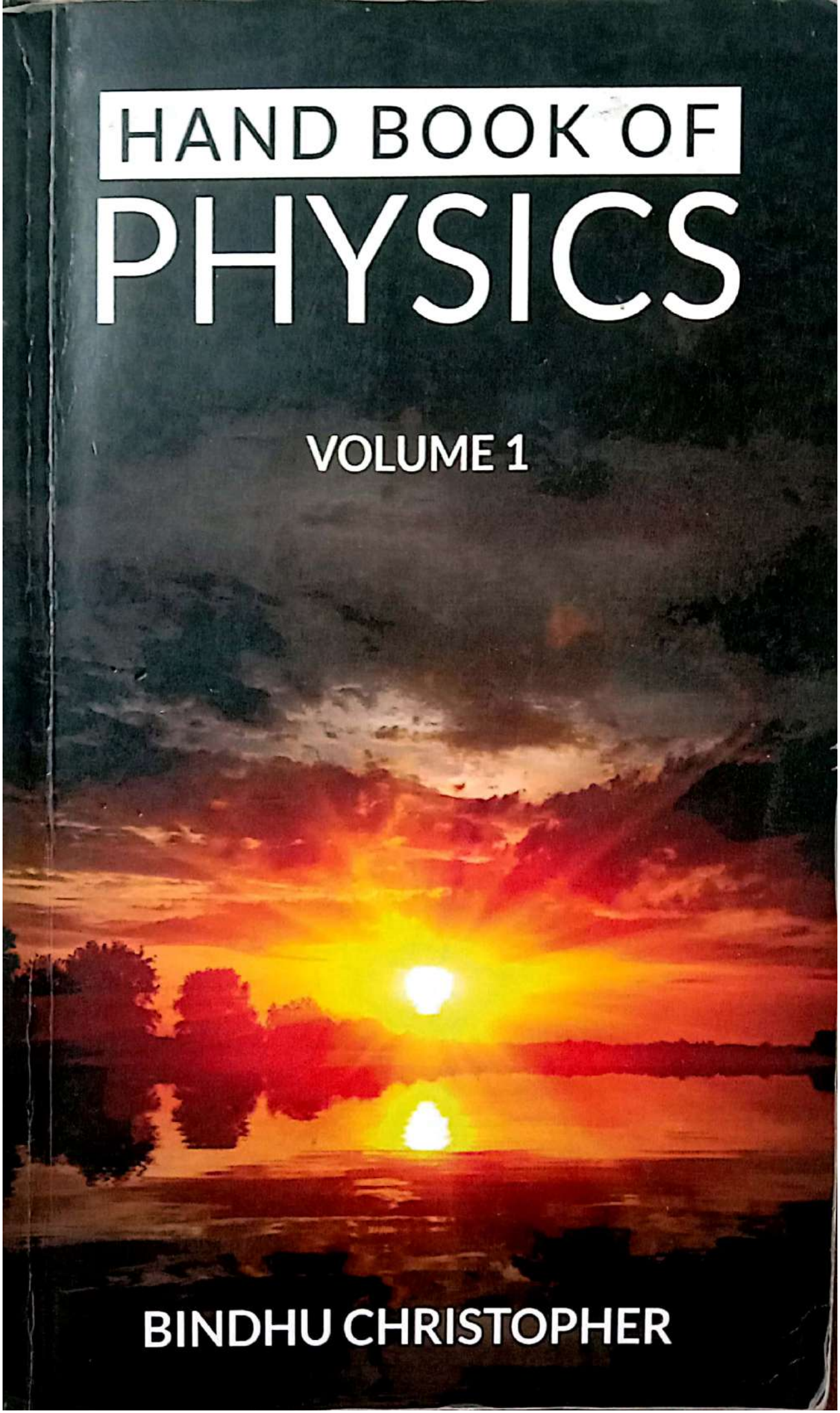

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Contents

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CHAPTER 1
OPTICS

- ***Optics***
  - Optics is the branch of physics which deals with the behavior and properties of light, suchas interactions with matter, the construction of instruments that use or detect it etc.
- ***Laws of reflection-***
  - According to the first law of reflection the angle of the reflection is equal to the angle of the incidence.
  - According to the second law of reflection incident ray reflected ray and the normal to the point of incidence all lie in the same plane.
- **Sign Conversion-**
  - According to the sign conversion, all distances are measured from the pole of the mirror or the optical centre of the lens.
  - The distances measured in the same direction as the incident light are taken as positive and those measured in the direction opposite to the incident light is taken as negative.
  - The height measured upward as taken as positive .The height measured downward as taken as negative.

HAND BOOK OF PHYSICS

Ms.Bindhu Christopher (MSc,BE.d,NET,SET) working as assistant professor on contract in the department of physics Fatima Mata National College (Autonomous), Kollam, Kerala. She already published seven books in the field of physics for competitive exams.In this book titled as "Hand Book of Physics Volume 1"She include varies facts and concept from modern physics. Hand Book of Physics Volume 1 is a well organized test gives the knowledge about the facts and concept in Physics.In this volume the author include the general ideas about the branch of physics such as Optics, Electronics, Qunatum Mechanics, Statistical Physics, Thermodynamics, Atomic and Molccular Physics and Astrophysics. This book has qualitative information about Modern Physics.It has a wide range of information for students aspiring for higher education.

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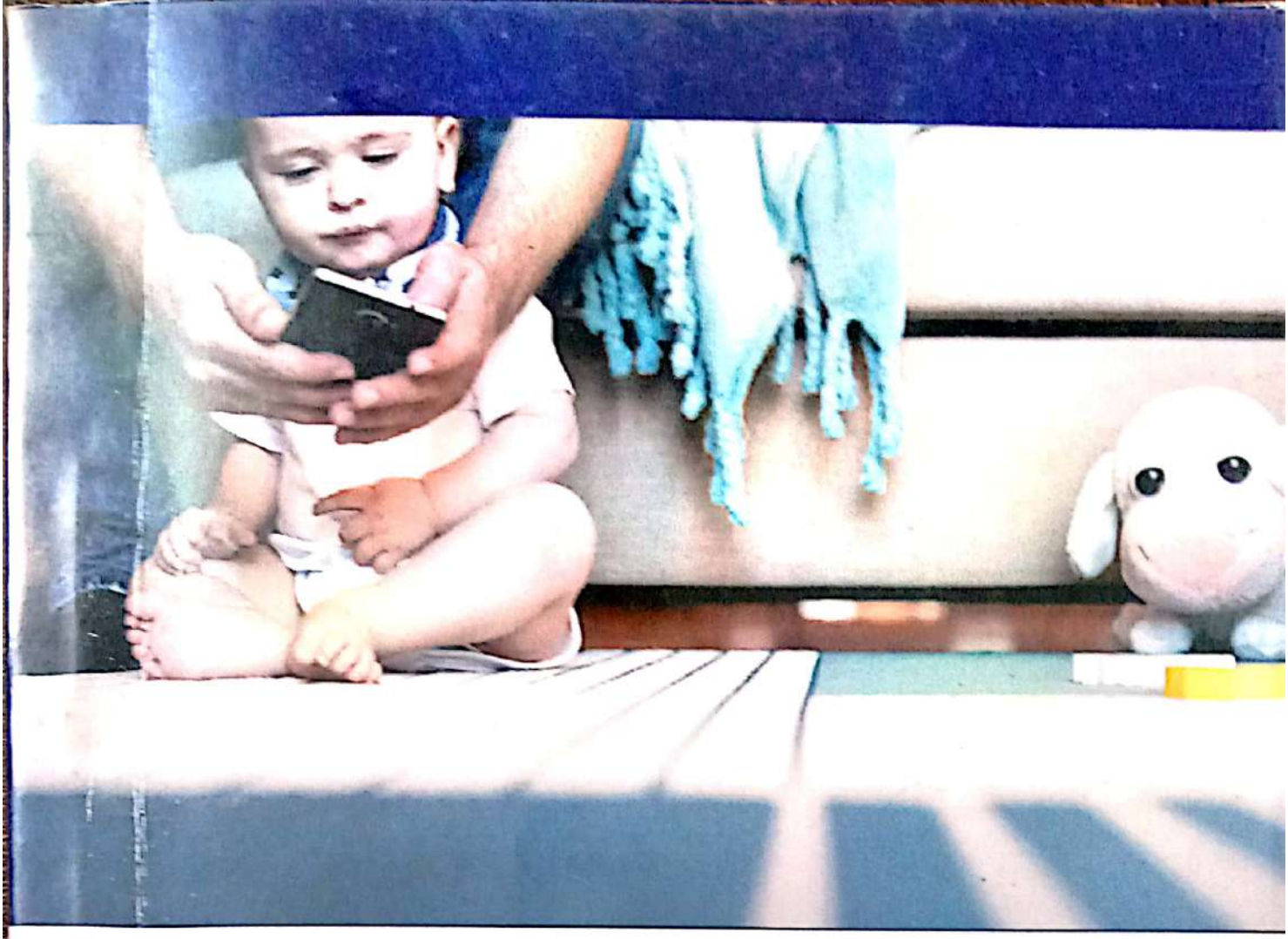

Bindhu Christopher

Biological Effects of Mobile Communication Technology

A Short Review

LAP LAMBERT Academic Publishing

Bindhu Christopher

Biological Effects of Mobile Communication Technology

A Short Review

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CHAPTER 1

INTRODUCTION

We are sailing in a radiation sea. The living and non-living things always exposed to radiation. Radiation is the process of emission of particle or energy. Radiation is of two types,

Ionizing radiation

&

Non-ionizing radiation

Ionizing radiations are ionizing the medium they pass. Non-ionizing radiation does not ionize the medium they pass. But this radiation can produce heating effects.

In communication systems radio waves are widely used due to the low ionizing properties of this

The book titled by "Biological effects of mobile phone communication - a short review" the author try to review the scientific evidences related to mobile phone communication radiation.This book is a well organized book based on more than 200 research publications in reference with the biological effects of mobile phone radiation. This book give an awareness about mobile phone radiation and how to be protect us from these harmful radiation.

Ms.Bindhu Christopher (MSc,BEd,NET,SET) working as assistant professor on contract in the dept of Physics Fatima Mata National College (Autonomous), Kollam, Kerala, India. She published several books in physics for competitive exams. In this book she includes the scientific experimental reviews based on mobile communication technology radiation.

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Medicinal Chemistry- Fundamentals and Applications

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Contents

Invited Talk

BIOINFORMATICS AND COMPUTER AIDED DRUG DESIGNING (CADD)

Maala S. Kumar[a], Anuroopa G. Nadh[a], AchuthSankar S.Nair[a]
anuroopasanju@gmail.com

[a]Department of Computational Biology and Bioinformatics, University of Kerala

Bioinformatics has become an integral and inevitable part of modern chemical, biological and pharmaceutical science to decrypt and depict the hidden information in DNA or protein sequence, that inturn describes and determines it's structure and function. Drug discovery is an interdisciplinary, expensive and time-consuming process when executed on manual bases. Computer Aided Drug discovery is one of the major application of Bioinformatics which aims to supplement wet lab experiments in *in silico* system and thereby enormously reducing the time and cost. In Computer assisted Drug Discovery(CADD), computational techniques are used to simulate drug-receptor interactions. Approaches used in CADD can provide valuable information for target identification and selection, lead identification and design, small-molecule screening and optimization. CADD have manifested promising applications for design of novel drug with minimal side effect and high potency. This session aims at delivering a brief outline on bioinformatics and CADD, biological database, homology modelling, disease target identification, structure retrieval of both target and ligand, molecular docking, and result interpretation. This is intended to enable the non bioinformaticians to be adept with basic computational techniques in molecular and structural biology.

EQUILIBRIUM ISOTHERM MODELLING OF BIOCHARS FOR THE REMOVAL AND RECOVERY OF LEAD FROM WATER AND WASTEWATERS

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Department of Chemistry, Fatima Mata National College, Kollam,

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Abstract

Main objective of this novel study was to evaluate the feasibility of Pb removal by biochar prepared from banana stem. For this purpose, the sorption of Pb(II) was tested in a series of adsorption experiments and adsorption capacity of biochar measured using UV-Visible spectro-photometry. Optimum pH for the removal of Pb(II) was evaluated, and was found to be at pH 5.0. Equilibrium isotherm studies were carried out Langmuir model represents the experimental data fairly well as is evident from the correlation coefficient r^2 and relative standard deviation ($\Delta q\%$).

Introduction

Biochar is a carbon rich solid derived by pyrolyzing biomass with little or no oxygen [1],it can be applied to soil for both agricultural and environmental gains [2]. Biochar is usually produced from crop residues, wood biomass, animal litters, and solid wastes via various thermochemical processes, including slow pyrolysis, fast pyrolysis, hydrothermal carbonization, flash carbonization,torrefaction and gasification [3]. During the past several years, application of biochar in to soil has become a new exciting biotechnology with benefits of Using biochar in terms of soil amendment, enhancing of crop yield, mitigating global warming and carbon sequestration[2]. Recently, considerable research efforts have also been conducted on biochar-based adsorbents for removal of aqueous contaminants, which can exert beneficial win-win effects for both carbon sequestration and water pollution control[4,5]. Biochar has exhibited a great potential to adsorb water contaminants due to its wide availability of feed stocks, low-cost and favourable physical/chemical surface characteristics [5].

Water contamination by lead is reported throughout the world as one of the major environmental problems. Recently, the water Resources Ministry of India reported that aquifers in 63 districts contain heavy metals like lead, chromium and cadmium[6]. Activated carbon is most frequently used adsorbent for water and wastewater treatment [7,8]. Due to several problems, activated carbon requires replacement with low cost sustainable material. Different methods include photocatalysis, reverse osmosis and nanofiltration are available to

treat lead. Among these adsorption has emerged as the front line of defence, especially for metals which cannot be removed by other techniques.

Main objective of this novel study was to evaluate the feasibility of Pb removal by biochar prepared from banana stem. For this purpose,the sorption of Pb(II) was tested in a series of adsorption experiments and adsorption capacity of biochar measured using UV-Visible spectro-photometry

2.Methods

2.1 Materials

Banana stem were obtained from agricultural farm.After being washed,the stem were cut in to small pieces and dried. Then crushed into fine powder. Pb(II) aqueous solution were prepared by diluting the stock solutions of $Pb(NO3)_2$(1000 mg/L) to desired concentration with deionized water.Different solutions pHs were adjusted by HNO_3(1N) and NaOH(1N).Chemicals including NH_3 solution,Na_2S were used in this work

2.2 Preparation of adsorbent

Biochar prepared by weighing 10 g of banana stem powder in to silica crucible,which were placed without tops in a preheated muffle furnace[9] at 350° c for 12 hrs.After heating for a specific time, crucible were allow to cool and kept in a desiccator

2.3 pH Study

pH studies were carried out by adding a desired weight of biochar into 100mL conical flasks containing Pb(II) solution with a concentration 10mg/L and 25mg/L.After agitating at 150 rpm in a mechanical shaker for a desired time ,the conical flasks were withdrawn and placed in ice water bath .After that the mixtures were filtrated through filter paper and and the absorbances were determined using uv-visible spectro photometry.

2.4 Equilibrium Study

Equilibrium sorption experiments were implemented under equally defined and optimized conditions.Equilibrium data were fitted to Langmuir model,Eq(1), which assumes homogeneous monolayer adsorption [10].

$$q_e=q_{max}k_LC_e/1+k_LC_e \text{------(1)}$$

q_e the amount of solute adsorbed at equilibrium(mg/g),C_e the amount of solute in the aqueous phase at equilibrium (mg/L),q_{max} the maximum adsorption capacity(mg/g) and k_L(L/mg) the affinity coefficient of Langmuir model

2.5 Desorption study

The biochar loaded with Pb(II) treated with 1N NaOH followed by 4 hr mechanical shaking. The absorbance noted with the help of UV-Visible spectrophotometer.

3. Result and Discussion

3.1 Effect of pH

Pb(II) uptake versus pH studies on biochar conducted in the pH range 2-9 to determine the optimum pH. An initial 10 mg/L Pb(II) followed by 25 mg/L Pb(II) concentrations were employed. Pb(II) form several hydrolysis products under different conditions. Pb(II) hydrolysis product form at pH>6.0. Thus,Pb(II) will exist as solvated hydroxides in the adsorptive solutions. The amount of Pb(II) adsorption is very low at pH 1-2 then increases to next 3 pH units. At pH >6 metal removal from water took place by both adsorption and precipitation caused when OH^- present in water forms $Pb(OH)_2$. The final pH increased as the initial solution pH was raised for acidic solutions. Thus, neutralisation and sorption are two parallel processes. Higher pH values favoured protonation of sorbent's phenolic, hydroxyl, carboxylic acid and other acidic functions [11].

In ion exchange mechanism, pH should decrease due to the release of H^+ ions. But actually the equilibrium pH increases this is due to the neutralization of H^+ ions by oxygen containing functional groups including hydroxy, anhydride, carboxylicacid, ketone, quinone, ether ,lactone, pyrone, catechol, hydroxy ketone and other functional groups present on the biochar surface. Percentage of absorbance at 0-7 pH for 10 mg/L and 25 mg/L are listed in table.1 and corresponding graph depicted in fig.1.

Table 1. Effect of pH on lead (II) removal

pH	% Removal 10 mg/L	% Removal 25 mg/L
2	0	0
3	0	0
4	0	0
4.5	90	83
5	99	98
6	92	90
6	85	82
	82	77

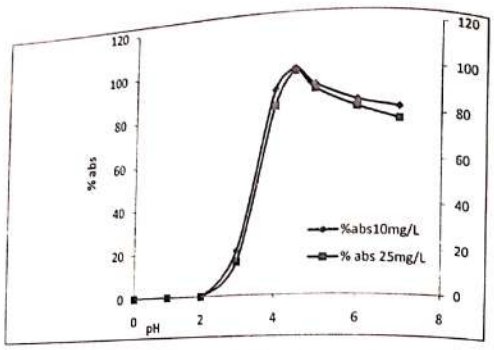

Table 2. Equilibrium isotherm studies for the removal of Pb(II) ions

Concentration (mg/L)	% removal
50	92
75	86
100	80
150	60
200	47

3.2 Equilibrium study

Lead sorption equilibrium studies conducted at optimum pH 4 for 50, 100, and 200 mg/L concentrations. This data was analysed using Langmuir isotherm model and used to calculate maximum monolayer adsorption capacities. The regression coefficient obtained from experimental data. For adsorption, an adsorbent dose of 2g/L was taken .The equilibrium study suggested that the data fitted very well to the Langmuir isotherm and this indicates the monolayer adsorption

From adsorption isotherm, the maximum amount adsorbed was found to be 48mg/g.Datas entered in table.2 and the nonlinear Langmuir isotherm given in fig.2.The parameters evaluated using nonlinear regression fig.3.

The desorption study were conducted. Biochar loaded with Pb(II) washed 2-4 times with deionized water .Drained well and mix with 0.1N NaOH followed by shaking about 4 hrs. Finally the absorbance measured using UV-Visible spectrophotometer. A series of adsorption desorption studies were conducted using 25mg/L Pb(II) solution and adsorbent dosage 2g/L. Data obtained indicate that the adsorbent can be regenerated and reused.

Conclusion

The adsorbent produced from banana stem was able to remove Pb(II) from waste water. The optimum pH found to be 4.The data very well fitted to Langmuir isotherm hence the adsorption will be monolayer adsorption.

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OPTICAL PROPERTIES AND BAND GAP ANALYSIS OF SOME CERIUM (IV) BASED COMPOUNDS

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[2]Department of Chemistry, DB College Sasthamcotta, Kollam, Kerala

ABSTRACT

Cerium(IV) based samples namely Cerium phosphate (CP), Cerium molybdate (CM), Cerium phosphomolybdate (CPM) and Acrylamide cerium phosphomolybdate (AACPM) in the present study were obtained as yellow solids. They show maximum absorption in the ultra-violet region. Ligand to metal double-charge transfer transitions, are responsible for the bright colours of the materials. The absoption edge around 250nm for the samples is an indication of the presence of band gap in the materials. The study reveals that the band gap of the material can be tuned by incorporating different anions and organic molecules. The band gap energy of the synthesized samples obtained were in the range 1.2 – 3.5 eV.

Key words

cerium(IV), charge transfer transition, optical band gap

INTRODUCTION

Rare earth ions absorb electromagnetic radiation in the near visible and near infra-red region. In rare earth ions electronic transitions are caused by incomplete 4f subshell [1]. Charge transfer transitions are also observed in rare earth ions [2]. The energy of charge transfer band decreases as the ease of reduction of lanthanide ion increases. Cerium absorbs strongly below 400nm caused by charge transfer transitions. Band gap strongly influences the electrical and optical properties of a material [3]. Many beneficial properties of cerium and its compounds depend critically on their ultraviolet absorption characteristics [4]. On account of the several beneficial properties exhibited by cerium and its compounds due to their strong ultraviolet absorption capacity, it was thought of interest to analyze the ultraviolet-visible absorption spectra of the cerium based compounds covered in the present study namely- CP, CM, mixed material CPM and its composite AACPM.

EXPERIMENTAL

Preparation of samples

CP in the present study was prepared by adding an aqueous solution of disodium hydrogen phosphate to half its volume of ceric sulphate slowly, with continuous stirring at pH~2. Equimolar solutions of ammonium heptamolybdate and ceric sulphate were mixed in the volume ratio 1:2 at pH~2, for the preparation of CM. Aqueous solution of ammonium heptamolybdate (100ml) and disodium hydrogenphosphate (200 ml) were added to an aqueous solution of ceric sulphate (100 ml), slowly with continuous stirring at pH~2 for the preparation of CPM. Equimolar solutions of ceric sulphate, ammonium heptamolybdate and disodium hydrogen phosphate in the volume ratio 1:1:2 were mixed with acrylamide solution containing 500 mmoles with very slow and continuous stirring for the preparation of AACPM.

In all the above cases, the gel obtained was kept overnight at room temperature in contact with the mother liquor for the growth of fine particles. The granular precipitate thus obtained in each case, was filtered, washed with demineralized water till free of chloride and sulphate ions and finally dried at 40^{0}C. All materials after drying were broken to desired particle size by grinding and sieving.

Instrumentation

The elemental analysis of the samples, were carried out with Thermo Electron IRIS Interpid II XSP Duo, ICP-AES Spectrometer. UV-Visible Perkin Elmer Spectrophotometer (Lamda-850) was used to obtain the optical absorption spectra of the samples. Data were collected in the absorbance mode in the wavelength range of 200 – 800nm.

RESULTS AND DISCUSSION

CP was obtained as a pale yellow solid. CM was a hard bright orange solid while CPM and AACPM as bright yellow powder. Elemental analysis shows that the percentage of cerium in CP, CM, CPM and AACPM are 38.36, 17.28, 5.88 and 10.36 % respectively. Wide band gap materials appear bright yellow due to ligand to metal charge transfer transitions. Metal anions like vanadate, molybdate, tungstate are colourless [5]. However, when they are combined with a cation like Ce^{4+}, in high oxidation state, the charge transfer may be shifted to the visible region.

Therefore, the colour of CM, CPM and AACPM may be solely attributed to the followin charge transfer transitions: (O_{2p} ⟶ Ce_{6s}); (O_{2p} ⟶ Ce_{4f}); (O_{2p} ⟶ Mo_{3d}). The Ult violet-Visible absorption spectra of the samples are presented in Figure-1a.

All the samples show maximum absorption in the ultra-violet region which is a commo characteristic of cerium(IV) [4]. The absoption edge around 250nm for the samples is a indication of the presence of band gap in the materials. The value of optical band gap obtained by best-fit method by plotting $(\alpha h\nu)^2$ versus hν, as per the Tauc relation [6]. Th graphical representation for the samples is shown in Figure-1b. The band gap energy(E_g obtained for the simple salts CP (1.211 eV) and CM (1.336 eV), were found to be close to th values reported for the semiconductors commonly used namely Si (1.1 eV) and CdTe (1.5 eV respectively [7].

Figure-1a UV-Visible spectrum of the samples

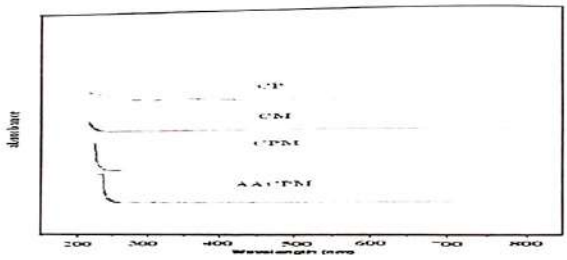
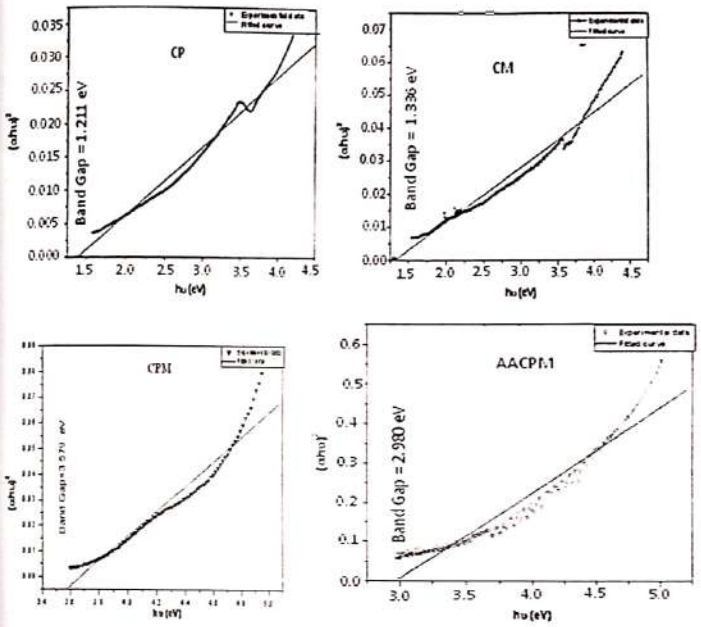


Figure-1b

Band gap of CP, CM, CPM and AACPM as per Tauc relation



The optical band gap energy of CPM determined from absorption spectra is found to be 3.5 eV which is almost close to the band gap observed in the case of CeO_2 (~ 4 eV), a wide band gap semiconductor that has long been used for its catalytic capabilities [8]Wide band gap semiconductors are often utilized in optoelectronic and power devices. They are often utilized in applications where high temperature operation is important [9]. Thus CPM with wide band gap may find application in the above fields. The E_g value of AACPM (2.9 eV) is almost equal to that of the rutile phase of TiO_2 (3.06 eV), which is a versatile pigment. The bright colour and UV-absorption ability of the materials reveal their possible application as pigment and sunscreen [10]. Shinya et al. have reported that such inorganic pigments made of less toxic elements are usually inert and they are safe to be used[11]. Toxic metals namely Cd, Cr, Pb and Co used in pigments can be replaced by less toxic cerium based materials .[12, 13].

CONCLUSION

The materials in the present study show band gap ranging from 1.2 to 3.6 eV. Among th studied cerium based materials, the simple salts CP and CM possess lower band gap energy i comparison to their mixed salt CPM and its composite AACPM. The study reveals that the ba gap energy of the materials can be tuned by incorporating different anions and organ molecules. It is also observed that the increase in cerium content decreases the band gap energ of the materials.

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ASSESSMENT OF NATURAL RADIATION EXPOSUREIN BRICK AND GRANITESAMPLESCOLLECTED FROM KOLLAM DISTRICT

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ABSTRACT

Concentration of ^{226}Ra, ^{232}Th and ^{40}K in 10 samples of building materials were measured using gamma spectrometer used with NaI(Tl) based detectors.The radiological risk factors such as radium equivalent activity, absorbed dose rate, indoor and outdoor annual effective dose rate,internal and external hazard index, radioactivity level index, alpha indexhave also been estimated.In the brick sample, the activity concentrations for ^{226}Ra varies up to 6.96 $BqKg^{-1}$ from the below detectable level, ^{232}Th varies from 9.77 $BqKg^{-1}$ to a maximum of 13.71 $BqKg^{-1}$ and ^{40}K varies from 59.80 $BqKg^{-1}$ to a maximum level of 81.64 $BqKg^{-1}$. In the case of granite, the detectable level of radium is noticed only in black with red coloured granite from the selected samples. The concentration of ^{232}Th and ^{40}K samples varies from 4.82 to 8.75$BqKg^{-1}$ and41.17 to 147.92$BqKg^{-1}$ respectively.The radium equivalent activity (Ra_{eq}) values of brick ranging from 18.57$BqKg^{-1}$ to 32.39$BqKg^{-1}$ and for granite ranging from 10.06Bq/Kg to 28.05Bq/Kg are less than the maximum admissible value of 370$BqKg^{-1}$.Total absorbed gamma dose rates of the selected samples are found to vary from 4.71$nGyh^{-1}$14.88$nGyh^{-1}$. External hazard index, H_{ex} for the samples studied in this work ranges from 0.027 to 0.087. The computed value of the internal hazard index varies from 0.027 to 0.106.The values of the parameters obtained shows that the materials are safe for the construction of dwellings.

INTRODUCTION

Radionuclides occurring naturally in building materials are sources of external and internal radiation exposure in dwellings, besides gamma radiation and cosmic radiation.External radiation exposure is caused by the gamma radiation originating from members of the uranium and thorium decay chain and from ^{40}K. Internal radiation exposure, mainly affecting the respiratory tract, is due to the short lived products of radon which are exhaled from building materials in room air[1]. The content of the natural radionuclides in

building materials is caused by the factors such as geological origin, composition of soil, density, porosity, content of water in soil, diffusion rate,rate of emanation and exhalation etc.[2]. Radon can move freely from the place of its origin through cracks in walls. Radon transportation is mainly due to diffusion and forced flow [3].This transportation of radon resulted inradiological risk to human health, which mainly depends on the factors such as the level of radon and duration of exposure. The worldwide average annual effective dose for natural sources is 2.4mSv of which 1.1mSv is due to basic background radiation and 1.3 mSv is due to exposure to radon [4]. This makes the importance of investigating natural radiation from building materials.

The present studies give an insight of the activity concentration of the natural radioactive nuclides namely, ^{226}Ra, ^{232}Th and ^{40}K of brick and granite, each of five samples. The material, brick is of great interest in construction industry since the raw material is easily available. The granite is not only used as a basic construction material but also as a decoration material. The wide use of these materials paves the way for testing the NORM levels. The gamma spectroscopic measurement technique is adopted for the measurement.

METHODOLOGY

A total of 10 samples of building materials are collected from Kollamdistrict for the measurement of natural radiation. The selected samples are brick and granite. These samples were crushed to get fine powder and moisture content is completely removed by heating at 110°C in an oven. The sample is then homogenized and sealed in radon impermeable airtight can with capacity of 305cm^3 for more than 30 days to reach secular equilibrium were the rate of decay of the daughter becomes equal to that of the parent. All samples were analyzed using a gamma spectrometer with NaI(Tl) based detector. The samples were counted for 10000seconds. The spectrum was stored in a PC based multichannel analyzer. Radiometric measurements were carried out for the determination of radionuclides present in the samples of building materials.

1. Determination of natural radioactivity

The activity concentrations of the radionuclides ^{226}Ra, ^{232}Th and ^{40}K forthe samples were determined using the equation.

$$SpecificActivity(BqKg^{-1}) = \frac{cps \times 100 \times 100}{Bl \times E_{ff} \times M}$$

Where cps is the net count per second; BI is the branching intensity and E_{π} is the efficiency of the detector.

2. **Radium equivalent activity (Ra_{eq})**

Radium equivalent activity is an index that has been introduced to evaluate the specific activities of ^{226}Ra, ^{232}Th and ^{40}K by a single quantity[6]. It is generally defined as

$$Ra_{eq} = C_{Ra} + 1.43\,C_{Th} + 0.077C_k$$

Where C_{Ra}, C_{Th} and$C_k$are activities of ^{226}Ra, ^{232}Th and ^{40}K respectively in Bq/Kg. The radium equivalent activity is defined on the assumption that 10Bq/Kg of 226Ra, 7 Bq/Kg of 232Th and 130BqKg^{-1} of ^{40}K produce the same gamma ray dose rates[7].The maximum value of radium equivalent must be less than 370BqKg^{-1} for the safe limit [8].

3. **Estimation of absorbed dose rate**

The absorbed dose rates(D) in air at above the ground surface for the uniform distribution of radionuclides(^{226}Ra, ^{232}Th and ^{40}K) was calculated using the following equation [9].

$$D(nGyh^{-1}) = (0.462\,C_{Ra} + 0.621\,C_{Th} + 0.0417\,C_K$$

Where the numerical values 0.462,0.621 and 0.417 are the dose conversion factors for converting activity concentrations of ^{226}Ra, ^{232}Th and ^{40}K into doses.

4. **External and internal hazard index**

The value of external hazard index should be less than or equal to unity for the safe use of building materials, which corresponds to the upper limit of Ra_{eq}370Bq/Kg for limiting the dose from building materials to 1.5mGyy^{-1}. External hazard index can be calculated using the equation [6],

$$H_{ex} = \frac{C_{Ra}}{370} + \frac{C_{Th}}{259} + \frac{C_K}{4810} \leq 1$$

Internal exposure to ^{222}Rn and its radioactive progeny is controlled by the internal hazard index (H_{in}) and is obtained by the equation [10], for the safe use of a material in the construction of dwellings internal hazard index should be less than unity.

$$H_{in} = \frac{C_{Ra}}{185} + \frac{C_{Th}}{259} + \frac{C_K}{4810} \leq 1$$

5. **Radioactivity level index**

The radioactivity level index is used to represent the γ radiation hazards associated with the natural radio nuclide. The representative level of Iγwas obtained by the equation [11].

$$I\gamma = \frac{C_{Ra}}{150} + \frac{C_{Th}}{100} + \frac{C_K}{1500}$$

6. **Alpha index**

The index is used for the assessment of internal hazard due to the radon inhalation originating from building materials and is defined by the equation [12],

$$I\alpha = \frac{C_{Ra}}{200}$$

Where $C_{Ra}$is the activity concentration of radium in and its recommended limit is 200Bqkg^{-1}. Hence for the safe use of building materials the value of I_{α}chosen to be less than unity.

RESULT AND DISCUSSION

The concentrations of the radionuclides are summarized in the **table 1**. In the brick sample, the activity concentrations for^{226}Ravaries up to 6.96 BqKg^{-1} from the below detectable level, ^{232}Th varies from 9.77 BqKg^{-1} to a maximum of 13.71 BqKg^{-1} and ^{40}K varies from 59.80 BqKg^{-1} to a maximum level of 81.64 BqKg^{-1}. In the case of granite, the detectable level of radium is noticed only in black with red coloured granite from the selected samples. The concentration of ^{232}Th and ^{40}K samples varies from 4.82 to 8.75BqKg^{-1} and41.17 to 147.92BqKg^{-1} respectively.

Sample type	Sample Name	^{226}Ra	^{232}Th	^{40}K
BRICK	SSS	4.77	11.76	75.27
	MGB	6.96	13.71	75.75
	TSB	BDL	9.77	59.80
	MA	5.00	13.08	78.82
	SR	BDL	12.01	81.64
GRANITE OF DIFFERENT COLOUR	BLACK	BDL	6.68	67.96
	BLACK WITH BROWN	BDL	8.75	130.35
	BLACK WITH ORANGE	BDL	5.52	112.43
	BLACK WITH RED	4.69	8.37	147.92
	GRAY	BDL	4.82	41.17

Table 2 presents the radiological risk factors such as radium equivalent activity, absorbed dose rate, internal and external hazard index, radioactivity level index, alpha index.

Sample type	Sample Name	Ra_{eq}(BqKg^{-1})	D(nGyh^{-1})	H_{ex}	H_{in}	I_γ	I_α
BRICK	SSS	18.57	8.56	0.050	0.050	0.137	-
	MGB	32.39	14.88	0.087	0.106	0.234	0.035
	TSB	27.38	12.64	0.073	0.086	0.199	0.023
	MA	30.27	13.95	0.081	0.097	0.220	0.027
	SR	23.46	10.86	0.063	0.063	0.175	-
GRANITE OF DIFFERENT COLOUR	BLACK	14.78	6.98	0.039	0.039	0.112	-
	BLACK WITH BROWN	22.56	10.87	0.060	0.061	0.174	-
	BLACK WITH ORANGE	16.55	8.11	0.044	0.044	0.130	-
	BLACK WITH RED	28.05	13.53	0.075	0.089	0.213	0.023
	GRAY	10.06	4.71	0.027	0.027	0.075	-

From the table it is clear that Ra_{eq} values brick ranging from 18.57BqKg^{-1} to 32.39BqKg^{-1} and for granite ranging from 10.06BqKg^{-1} to 28.05BqKg^{-1} are less than the maximum admissible value of370BqKg^{-1}. Total absorbed gamma dose rates of the selected samples are found to vary from 4.71 nGyh^{-1} 14.88 nGyh^{-1}. External hazard index, H_{ex} for the samples studied in this work ranges from 0.027 to 0.087. The computed value of the internal hazard index varies from 0.027 to 0.106.This fact indicates that the selected samples are safe for the construction purpose. The value of hazard indices and radioactivity level index are less than unity, hence the materials are safe for the construction of dwellings. It shouldbe noted that the alpha index values for brick and granite of selected samples were fall within a narrow range and are less than unity and hence account for all safety measures.

CONCLUSION

The gamma spectrometric measurement technique is used to analyze the activity concentrations of ^{226}Ra, ^{232}Th and ^{40}K. The risk factors such as Radium equivalent activity (Ra_{eq}), internal and external hazard index, absorbed dose rate, indoor and outdoor annual effective dose and Radioactive Level index were also calculated from the estimated value of the specific activity of ^{226}Ra, ^{232}Th and ^{40}K. It is concluded that the radiological parameters are normal and safe for the construction of dwellings.

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PREPARAION, PROPERTIES AND CRYSTAL STRUCTURE 2-(4-METHOXYPHENYL)BENZOTHIAZOLIUM TETRACHLOROCUPRATE(II)SALT

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INTRODUCTION

Recent developments in crystal engineering techniques have shown that the design of hybrid inorganic-organic compounds leads to the formation of materials with specific structural, magnetic, conductive and optical properties(Krishna Kumar et al, 2005). In the hybrids of the form $A_2[MX_4]$. where A is an organic cation usually a protonated base such as alkyl amine or heterocyclics such as morpholines, pyridines or pyrimidines, M is a transition metal ion and X is a halide, ionic and covalent layers are interconnected by non-covalent interactions leading to a three dimensional crystal lattice. Hybrid compounds of Cu(II) has gained attention due to the importance of Cu(II) in bioinorganic chemistry.

The hybrid inorganic-organic compound based on benzothiazole moiety is seldom reported. Benzothiazoles are biologically and industrially important compound with wide applications. It shows anticancer, antimicrobial, antidiabetic, antioxidant and HIV inhibiting properties along with interesting photochemical properties like luminescence or fluorescence. Here we report the synthesis, crystal structure and spectroscopic studies of a new organic-inorganic hybrid compound comprising square planar $CuCl_4^{2-}$ anion and almost planar 2-(4-methoxyphenyl)benzothiazolium, (mpbH) cation.

EXPERIMENTAL

Refluxing methanolic solution of 2-(4-methoxyphenyl)benzothiazole, mpb (2mmol, 0.482g) with methanolic solution of $Cu(NO_3)_2.3H_2O$ (1mmol, 0.241g) for 15 minutes and further acidified with HCl yielded green crystals suitable for X-ray

diffraction (Scheme -1). Yield-90%. Elemental Analysis- Calculated: C, 48.74; H, 3.50; N, 4.06; S, 9.29; Cl, 20.55; Cu, 9.21. Found: C, 48.22; H, 3.42; N, 4.00; S, 9.18; Cl, 20.25; Cu, 9.11.

$$2\ C_{14}H_{11}NOS\ (mpb) + Cu(NO_3)_2.3H_2O + 4HCl \xrightarrow[\text{Reflux/1h}]{\text{MeOH}} (C_{14}H_{12}NOS)_2CuCl_4 + 2HNO_3 + 3H_2O$$
$$[(mpbH)_2CuCl_4]$$

Scheme-I

RESULTS AND DISCUSSION

I.Spectroscopic characterization

The IR spectrum of ligand and its hybrid complex are quite silimar. The bands in the 1600-1380 range is due to overall ring skeletal (benzene and thiazole ring) stretching mode. Bands in the region 1308-962cm^{-1} correspond to the CH- in plane deformation while out of plane deformation are observed in the range of 860-726cm^{-1} (Gordana et al, 2007) The N-H bond, formed by the protonation of benzothiazole ring nitrogen in the complex, form an additional broadband at 3439cm^{-1} in the spectrum of the complex. Important IR bands and its assignment is give in the table below.

Table-1 Important IR bands and its assignment

compound	ν(N-H)	ν(C=N)	ν(C=S)	ν(OCH_3)	ν(benzothiazole ring)
L1		1597	687	1021.434	1600-1380
$(C_{14}H_{12}NSO)_2CuCl_4$	3439	1594	687	1021,434	1600-1380

The solid state electronic spectrum of the complex shows poorly resolved peaks at 620nm, 660nm and 740 nm corresponding to $^2B_{2g} \leftarrow {}^2B_{1g}$, $^2A_{1g} \leftarrow {}^2B_{1g}$ and $^2E_g \leftarrow {}^2B_{1g}$ transitions in a square planar complex having D_{4h} symmetry . The electronic spectrum of the compound in acetonitrile exhibit four absorption bands at 256, 294, 357 and 476nm. Strong band at 357 nm (ε = 2576) corresponds to Cl → Cu LMCT transitions and a

weak broad band at 476nm (ε = 407) corresponds to Cu→Cl MLCT and intra-ligand CT transitions. The UV portion of the spectrum is characterized by intense π-π* transitions of substituted benzothiazole ligand at 256nm (ε = 1806) and 303 nm. It is noticed that dissolution of $(mpbH)_2CuCl_4$ in acetonitrile is accompanied by a change in the green colour of the solid complex to yellow. This may be due to a change in the geometry of solid square planar $CuCl_4^{2-}$ ion to commonly observed distorted tetrahedral geometry in solution. The appearance of weak peaks at 1030nm(ε = 385) and 1265 nm (ε = 100) corresponding to $^2B_1 \leftarrow {}^2B_2$, $^2E \leftarrow {}^2B_2$ transitions of D_{2d} geometry support this observation.

The compound exhibits thermochromism. Thermochromic compound change colour on heating and revert to the original colour on cooling. On heating to around 180°C, the green colour of the solid $(mpbH)_2CuCl_4$ changes to yellow and revert to green colour on cooling. It is most likely that the green to yellow thermochromic transition corresponds to a $D_{4h} \rightarrow D_{2d}$ distortion of the $CuCl_4^{2-}$ ion due to a change in its trans angle, thereby changing the hydrogen bonding network of the entire crystal (Riley et al, 1998). This property gives ample scope for the application of this novel compound in optical memory storage devices

2.Magnetic study

Inorganic-organic hybrid complexes exhibit interesting magnetic behavior. There are reports of hybrid compounds exhibiting abnormal magnetic moments (Kobayashi *et al.*,). Therefore, magnetic moment measurement is an important tool in the characterization of hybrids.

Compound $(mpbH)_2CuCl_4$ have a room temperature magnetic moment of 1.15 BM. Such low magnetic moment is usually observed in complexes with low-dimensional antiferromagnetic exchange pathway due to irregular stacking or having some sort of molecular association through direct Cu-Cu interaction and/or magnetic exchange through bridging ligands. But single crystal data and electronic spectrum rule out any possibility of direct Cu-Cu interaction in this compound. Therefore, low magnetic moment may be due to variations in the spin alignment of $CuCl_4^{2-}$ units due to irregular stacking, which are

encapsulated between layers of $mpbH^+$ cations interconnected by bifurcated hydrogen bonding, short contacts and π-interactions resulting in antiferromagnetic exchange pathways.

The typical temperature dependence of the magnetic moments investigated in a field strength of 0.4 Tesla over the temperature range 20–300 K for $(mpbH)_2CuCl_4$ are shown in Figure 1. The magnetic moments are found to increase with decrease in temperature following a fluctuating mode. This investigation reflects the critical fluctuations in magnetic moments with increase in temperature due to structural phase transitions *via* rearrangement of hydrogen bonds within the crystal lattice

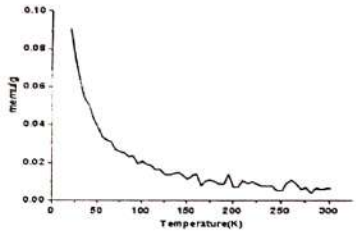

Fig. 1. Temperature dependence of magnetic moments for copper hybrids in a field strength of 0.4 Tesla between 20K and 300K

3.Crystal structure

The ORTEP view of $(mpbH)_2CuCl_4$ with atom labeling scheme is shown in Fig.1. The compound crystallizes in P-1 space group and contains discrete square-planar $CuCl_4^{2-}$ species held between layers of 2-(4-methoxyphenyl)benzothiazolium, $(mpbH^+)$ units, by hydrogen bonding, resulting in a 3D crystal lattice(Fig.2.). Each $CuCl_4^{2-}$ anion unit is interacting with six mpbH units in different layers as shown in Fig.3. Each organic layer contains mpbH monomers held together in a zig-zag manner by non-classical hydrogen bonds and dihydrogen bonds . These supramolecular chains, oriented antiparallely along b-cell direction, cross link together by pi-pi stacking interactions at perpendicular distance

3.327Å and 3.361Å, which is less than the van der Waal radii of 3.8 Å, forming a supramolecular inorganic-organic structure.

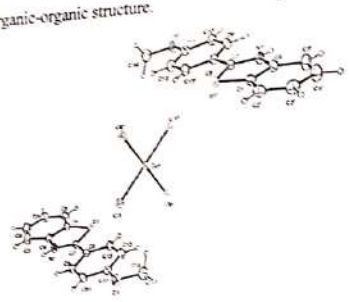

Fig.2. ORTEP diagram of $(mpbH)_2CuCl_4$ showing the atom numbering scheme. Displacement ellipsoids are shown at 50% probability level.

Fig 3. Interactions between $CuCl_4^{2-}$ and $mpbH^+$ units **(1)**, pi-anion interaction **(2)**.

CONCLUSION

We have reported the synthesis, spectroscopic and structural characterization of thermochromic, green 2-(4-methoxyphenyl) benzothiazolium tetrachlorocuprate(II), $(C_{14}H_{12}NSO)_2CuCl_4$. It is the first organic-inorganic hybrid co-crystal of a

benzothiazolium derivative and $[CuCl4]^{2-}$ anion. Single crystal reveals alternate organic and inorganic layers interconnected by hydrogen bonding interactions

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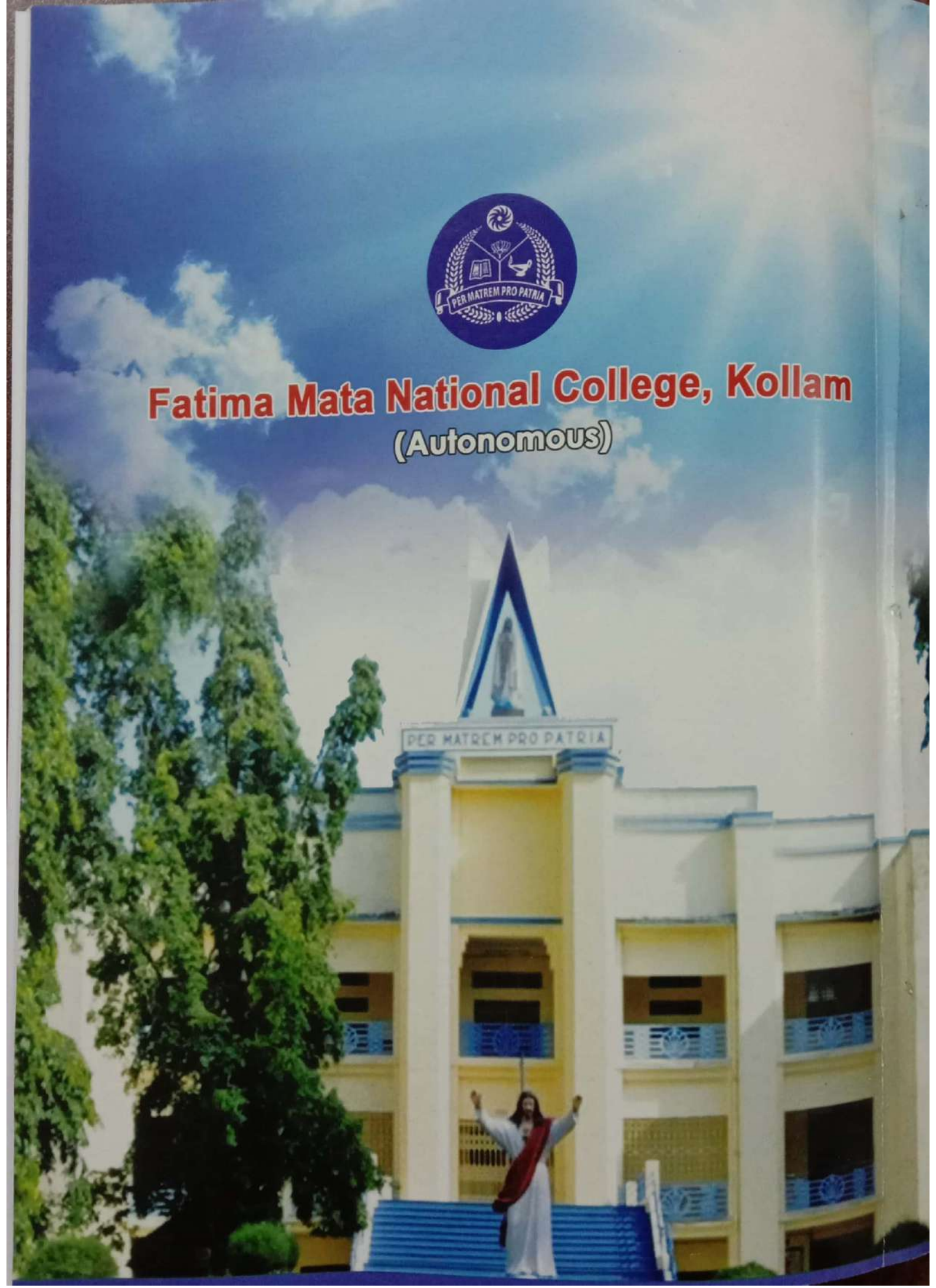

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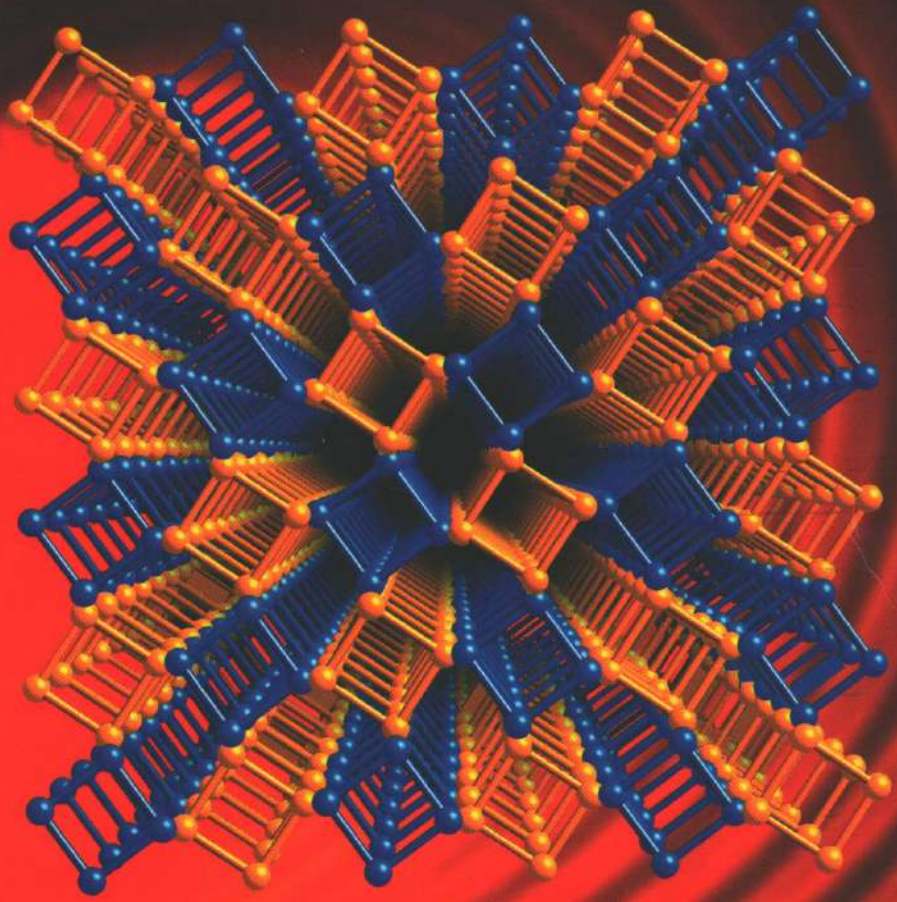

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COLLEGE WITH POTENTIAL FOR EXCELLENCE

10.40 AM-10.50 AM	*Coffee Break*	
10.50 AM-11.40 AM	PLENARY LECTURE- 5: **Prof. Spiros H Anastasiadis** *(Director, Institute of Electronic Structure and Laser, Greece)*	
11.40 AM-12.30 PM	PLENARY LECTURE- 6: **Prof. Dr. Peter Baeuerle** *(Director, Institute of Organic Chemistry II and Advanced Materials, Ulm University, Germany)*	
12.30 PM-1.30 PM	*Lunch Break*	
1.30 PM-2.00 PM	**Hall-1**	**Hall-2**
	KEYNOTE LECTURE-5: **Dr. P K Panda** *(CSIR-National Aerospace Laboratories,* *Bangalore, India)*	KEYNOTE LECTURE-6: **Prof. Constantinos Simserides** *(Dept. of Solid State Physics National and Kapodistrian University of Athens , Greece)*
2.00 PM-2.30 PM	KEYNOTE LECTURE-7: **Dr. Sandeep Kumar** *(Raman Research Institute Bangalore, India)*	KEYNOTE LECTURE-8: **Prof. M Padmanabhan** *(Amrita University Kerala, India)*
2.30 PM-3.00 PM	KEYNOTE LECTURE-9 : **Dr. CV Tomy** *(Head, Dept. of Physics,* *IIT Bombay)*	KEYNOTE LECTURE-10: **Prof. Dr. Mohd Kamarulzaki Mustafa** *(Deputy Dean of R&D,* *Universiti Tun Hussein Onn, Malaysia)*

3.00 PM-3.20 PM	INVITED TALK-5: **Dr. Kishore Sridharan** *(Dept. of Physics* *NIT- Karnataka, India)*	INVITED TALK -6: **Dr. Amal Kumar Das** *(Department of Physics IIT Kharagpur, India)*
3.20 PM- 3.40 PM	INVITED TALK -7: **Dr. Diby Paul** *(Konkuk University, SEOUL, South Korea)*	INVITED TALK -8: **Dr. Madhavan Jaccob** *(Loyola College Chennai – India)*
3.40 PM-3.50 PM	*Coffee Break*	
3.50 PM-6.20 PM	**ORAL PRESENTATIONS**	

Hall 1	Hall 2	Hall 3	Hall 4
AO 3018	AO 3214	CO 3056	DO 3250
AO 3031	AO 3221	CO 3061	DP 1007
AO 3063	AO 3231	CO 3070	EI 522
AO 3089	AO 3247	CO 3125	EO 572
AO 3099	AO 3252	CO 3131	EO 1000
AO 3100	AO 3260	CO 3132	EO 1001
AO 3102	AO 3262	CO 3161	EO 3078
AO 3103	AP 1202	CO 3167	EO 3094
AO 3109	FO 3164	CO 3173	EO 3158
AO 3124	FO 3204	CO 3275	EO 3182
AO 3133	CO 3215	CO 3178	CO 3200

electron diffraction pattern of the synthesised sample showed spots together with rings indicating polycrystalline nature. The size of the crystallites, calculated using DebyeScherrer Formula (<30nm), Transmission Electron microscopy (100-300 nm) and Scanning Electron Microscopy (60-200nm) confirmed the presence of irregular aggregates of nano-crystals. Functional group analysis of the sample done using Fourier Transform Infrared studies (FTIR) showed the presence of two sharp peaks around695 nm and 480 nm assigned to asymmetric stretching vibration of Al/NiO_6octahedra and their bending vibration respectively[2]. The elemental compositional analysis using Energy Dispersive X-ray analysis shows that the sample contains La, Al and Ni and O alone in atomic percentage without any foreign elements. The thermomagnetization curves M(T) under field cooled (FC) cycle shows that with decreasing temperature moment increases and shows no magnetic transition. The paramagnetic moment were theoretically calculated and obtained experimentally through curie-weiss fit and are found to agree with each other.Magnetic Hysteresis is absent with a little remanence (M_R) and coercivity (H_C). Moment shows a rapid increase with increasing applied magnetic field without saturation.

FO3086.

Role of nickel oxide in enhancing the electrochemical oxidation of dopamine at nickel oxide doped solar graphene modified glassy carbon electrode.

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2.Department of Chemistry Sree Narayana College for Women Kollam
3.Department of Chemistry Sree Narayana College Kollam

Graphene is a two dimensional sheet of SP^2 hybridised carbon atoms in a hexagonal honeycomb lattice. Its novel properties can be exploited for modification of electrodes used in sensing of many useful molecules. The electrocatalytic oxidation of dopamine (DA) at bare glassy carbon electrode (GCE), solar graphene modified GCE (sG/GCE) and nickel oxide doped sG/GCE (NiO-sG/GCE) was investigated in 0.1M (pH 4) phosphate buffer solution (PBS). The oxidation process and its kinetics were studied using cyclic voltammetry (CV) and chronoamperometry (CA). Enhanced kinetics for the oxidation of DA was observed at NiO-sG/GCE compared to bare GCE and sG/GCE. The CV peak separation of DA which was about 316mV at bare GCE decreased to 92mV at sG/GCE and to 70mV at NiO-sG/GCE. The values of diffusion coefficient and transfer coefficient of DA at NiO-sG/GCE were higher than that at sG/GCE and bare GCE. The rate constant for the oxidation of DA also showed a hundredfold increase at NiO-sG/GCE compared to sG/GCE and bare GCE. All these are prospective pointers to the enhanced catalytic activity of NiO-sG composite for the oxidation of DA. Very low detection limit for DA was also achieved as a result of nickel oxide doping.

FO3087.

Asymmetric Catalysis Using Functionalized Carbon Nanotubes

Kalluri VS Ranganath, Mahendra Sahu, Melad Shaikh
Guru Ghasidas University (Central University), Bilaspur-405009

The carbon nanotubes (CNTs) exhibit fascinating electronic, mechanical and electronic properties with a wide range of applications. The modification of active metal surfaces, to create a

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St. Thomas College, the sparkling diamond in the crown of the Diocese of Palai was founded by H.E. Bishop Mar Sebastian Vayalil on 16th April 1950 and inaugurated on7th August 1950. The College has emerged as a leading centre of higher education in moulding the lives of thousands of students from an agrarian rural background in the central part of Kerala. The college which entered the new millennium under the patronage of H.E. Bishop Mar Joseph Pallikaparampil is now administered by the able hands of H.E. Bishop Mar Joseph Kallarangatt (Patron), H. E. Mar. Jacob Muricken (Manager), Rev Dr. Joseph Kollamparampil (Pro-Manager)and Dr. Sunny Joseph (Principal).

AT A GLANCE

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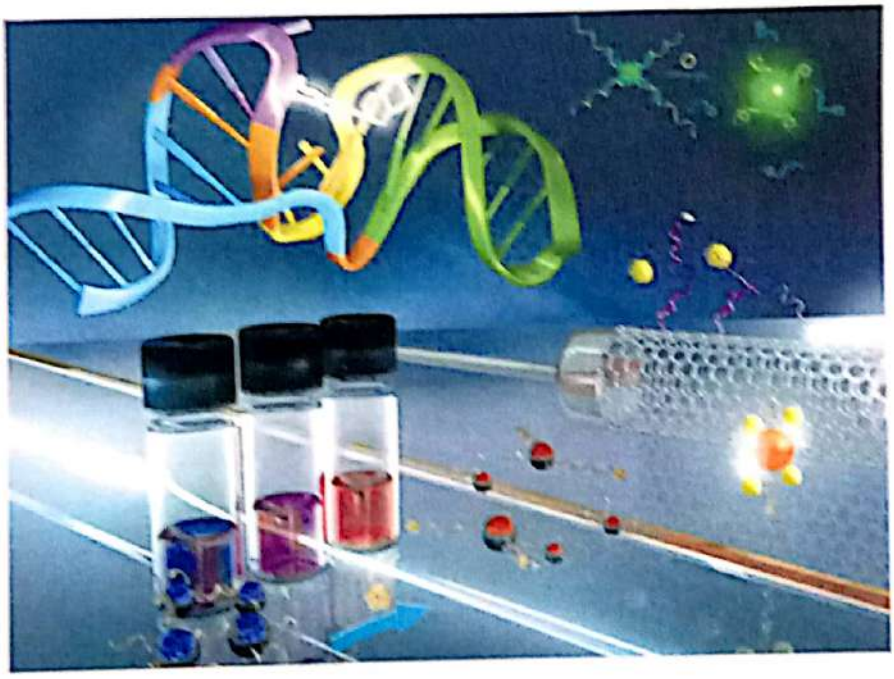

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INVITED LECTURES - I

Dr. K.V. Radhakrishnan
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Tapping the potential of hottest hotspot of the World biodiversity:Phytochemical profiling of medicinal Plants from SAHYADRI (WesternGhats)

Information and knowledge on the chemistry, the availability pattern of the biochemical compounds vis-à-vis the ecology of such plant species and the nutrition value of most of the Kerala's food and health biodiversity is woefully inadequate today. Many of the traditionally cultivated or conserved species that have historically contributed to food, nutrition and health needs of the people (often those belonging to the poor and vulnerable sections) became neglected! It is imperative therefore for botanists, social scientists, agricultural scientists; natural product chemists, medicinal chemists, nutrition experts and biochemists to work together with the local community to produce evidence based knowledge that will help to take better decisions for the sustainable management of this dying biodiversity of India.

Along this line, we undertook the phytochemical and bio-evaluation of a selected group of high priority plants of Kerala for food, nutrition and health, with special emphasis on plants with proven activity based on traditional knowledge (Ayurveda, traditional healing practices, folk claims and oral health traditions of Kerala).

INVITED LECTURES - V

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Applications of Computational Quantum theory

Quantum mechanics gives a mathematical description of the behavior of electrons that has never been found to be wrong. However, the quantum mechanical equations have never been solved exactly for any chemical system other than the hydrogen atom. Computational Chemistry is the modeling of chemical phenomenon using computers rather than chemicals. The entire field of computational chemistry is built around approximate solutions. Some of these solutions are very crude and others are expected to be more accurate than any experiment that has yet been conducted. There are several implications of this situation. First, computational chemists require knowledge of each approximation being used and how accurate the results are expected to be. Second, obtaining very accurate results requires extremely powerful computers. Third, if the equations can be solved analytically, much of the work now done on supercomputers could be performed faster and more accurately on a PC.

Computational chemistry is used in a number of different ways. One particularly important way is to model a molecular system prior to synthesizing that molecule in the laboratory. Although computational models may not be perfect, they are often good enough to rule out 90% of possible compounds as being unsuitable for their intended use. This is very useful information because synthesizing a single compound could require months of labor and raw materials, and generate toxic waste. A second use of computational chemistry is in understanding a problem more completely. There are some properties of a molecule that can be obtained computationally more easily than by experimental means. There are also insights into molecular bonding, which can be obtained from the results of computations, that cannot be obtained from any experimental method. Thus, many experimental chemists are now using computational modeling to gain additional understanding of the compounds being examined in the laboratory. As computational chemistry has become easier to use, professional computational chemists have shifted their attention to more difficult modeling problems. No matter how easy computational chemistry becomes, there will always be problems so difficult that only an expert in the field can tackle them.

Enhanced Electrochemical Performance of Reduced Graphene Oxide Coated Glassy Carbon Electrode

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ABSTRACT

Reduced graphene oxide (RGO), was synthesized by solar exfoliation of Graphite oxide. The as prepared RGO was characterized by Raman spectroscopy, Fourier transform infrared (FTIR) spectroscopy and Cyclic Voltammetry (CV). RGO coated glassy carbon electrode (GCE) exhibited higher sensitivity towards the electrochemical redox behaviour of potassium ferricyanide compared to bare GCE. The excellent sensitivity of the RGO modified GCE (RGO/GCE) was due to the presence of edge planes and oxygenated defects in RGO; which were confirmed by Raman and FTIR spectra.

Keywords: Reduced Graphene Oxide, solar exfoliation, Cyclic Voltammetry

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