Research Proposal

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Designation and Department: M.sc physics
Date: 08/05/2025
Title: INFLUENCE OF THE DOPANT THIOUREA ON
FTIR AND UV SPECTRAL ANALYSIS OF PVALi2SO4 SOLID POLYMER ELECTROLYTE

Abstract:

The polymer Polyvinyl alcohol (PVA) doped with Lithium Sulphate and Thiourea (CH4N2S) salt membranes were prepared by solution cast technique. The prepared polymer films are characterized by FTIR and the complexion of polymer electrolyte films has been confirmed via FTIR studies. The linear optical parameters such as transmission, refractive index, extinction coefficient, reflectance and energy gap for the composition of Soil Polymer Electrolytes (SPE) based on polymer PVA and Li2SO4 and PVA-Li2SO4 doped with CH4N2S were studied using UV-visible spectroscopy

1. **Introduction**:

Ongoing research in polymer science focusing on new synthesis methods, properties enhancement, applications as Innovations in polymer processing techniques, including injection molding, extrusion, additive manufacturing (3D printing) and controlled/living polymerization methods like atom transfer radical polymerization (ATRP), reversible addition-fragmentation chain transfer (RAFT) polymerization.Polymer from variety of materials and existing in the market as molded article which are playing an important role in our day to day life. They are used in rubber as elastomers, plastic, resins, adhesives, paints varnishes, propeller shafts, electrical equipment, aircrafts, automobile parts, electrical ins Polymers play a crucial role in biomedical applications such as tissue engineering, drug delivery, medical devices, and regenerative medicine. Current research focuses on developing biocompatible and bioresorbable polymers with tailored properties to meet the specific requirements of medical applications,including controlled release of therapeutic agents and promoting tissue regeneration. Current research aims to optimize the dispersion of nanoparticles within polymer matrices and understand their effects on the overall material

2. Literature review:

1. Ihsan Ullah, Abdur Rab, Abdur Rahim, Muhammad Tariq, Ayaz Hassan, Tawfik.A.Saleh, jehangeer khan and Hizb Ullah Khan
2. Siyeon Lee, Heejin Koo, Hong Suk Kang, Keun-Hwan Oh, Kwan Woo Nam et al have investigated
3. Randhir Singh, Chandra Charu Tripathi have reported
4. Gulfam Nasar, Mohammad Saleem Khan, Uzma Khalil et al have prepared
5. Riza Asmaa Saari, Ryota Maeno, Warinda Marujiwat, Muhammad Shahrulnizam Nasri, Kazuazki Matsumura Yamaguchi et al investigated

3. Research objectives:

1. My aim is to develop sustainable polymer materials for packaging application.
2. I want to investigate the properties of polymer nanocomposites for energy storage.
3. I'm interested in designing polymer-based drug delivery systems.

4. Methodology:

Polyvinyl alcohol (PVA), sodium nitrate (Li_2SO_4), and Thiourea (CH_4N_2S) are used as raw materials.($PVA-Li_2SO_4-CH_4N_2S$),($PVA-Li_2SO_4$),($PVA-CH_4N_2S$) composite films were prepared by using solution casting methods. (PVA) was used as the polymer, (Li_2SO_4/CH_4N_2S) as the doping salts and double distilled water as a solvent.

5.Timeline:

I aim to complete my doctoral studies in polymer research within 3 years.

Year 1: Coursework and literature review
Year 2: Research and experimentation
Year 3: Writing and defending the dissertation

6. Resources:

Characterization technique

1. FOURIER-TRANSFORM INFRARED SPECTROSCOPY (FTIR)
2. ULTRAVIOLET-VISIBLE SPECTROSCOPY (UV-vis)

7. Ethical considerations:

1. **Environmental impact:** Minimizing waste,using eco-friendly materials when possible, and following protocols for disposal.
2. **Informed consent:** If working with human subjects or potentially hazardous materials ensuring proper consent and protocols are in place.
3. **Data integrity:** Maintaining accurate records, avoiding falsification, and ensuring reproducibility.
4. **Responsible innovation:** Considering potential applications and implications of your research.

8. Expected outcomes and significance:

1. **New polymer materials:** Development of novel polymers with unique properties.
2. **Improved properties**: Enhanced mechanical,thermal,or electrical properties.
3. **Sustainable solutions:** Development of biodegradable,recyclable, or eco-friendly polymers.

Some significance statements:

1. This research aims to develop sustainable polymers for packaging applications.
2. The expected outcomes will contribute to advancements in polymer-based energy storage devices.

9. References:

Aboutalebi SH, Chidembo AT, Salari M, Konstantinov K, Wexler D, Liu HK, Dou SX (2011) Comparison of GO, GO/MWCNTs composite and MWCNTs as potential electrode materials for supercapacitors. Energy Environ Sci 4:1855. https://doi.org/10.1039/c1ee01039e

Acerce M, Voiry D, Chhowalla M (2015) Metallic 1T phase MoS2 nanosheets as supercapacitor electrode materials. Nat Nanotechnol 10:313–318. https://doi.org/10.1038/nnano.2015.40

Bissett MA, Kinloch IA, Dryfe RAW (2015) Characterization of MoS2-graphene composites for high performance coin cell supercapacitors. ACS Appl Mater Interface 7:17388–17398. https://doi.org/10.1021/acsami.5b04672

Du G, Guo Z, Wang S, Zeng R, Chen Z, Liu H (2010) Superior stability and high capacity of restacked molybdenum disulfide as anode material for lithium ion batteries. Chem Commun 46:1106–1108. https://doi.org/10.1039/b920277c

Lu L, Xie Y (2017) Fabrication and supercapacitor behavior of phosphomolybdic acid/polyaniline/titanium
nitride core-shell nanowire array. New J Chem 41:335–346.

10. Appendix:

1. Appendix A: Detailed Synthesis Protocols: step-by-step procedures for polymer synthesis, including materials,equipment, and reaction conditions.
2. Appendix B: Characterization Techniques: Detailed descriptions of analytical methods used to characterize polymers, such as NMR, IR,DSC, or GPC.
3. Appendix C: Literature Review Tables: Summaries of relevant studies,including materials,methods, and key findings.