REPORT

1. **Title**: Synthesis and characterization of metallic nanowires as supercapacitors.

2. **Workdone**: In this work, the composite nanowires were electrochemically deposited from a single electrolyte comprising Ni^{2+} ions and pyrrole monomer components. As polypyrrole is a π-conjugated polymer that can be easily deposited via anodic electropolymerization whereas metal (Me) deposition takes place at negative potentials. Although the synthesis of PPy-Me nanowires is achievable via cathodic deposition at potentials more negative than -0.628 V. The successful synthesis of PPy/Ni composite nanowires was done via a three electrode electrochemical deposition method. Prior to deposition, the 80nm pore size polycarbonate membrane put in an ultrasonic bath in order to remove the impurities. The electrochemical deposition of PPy/Ni composite nanowires is conducted using an electrolyte containing Pyrrole monomer (0.25M), HNO_3 (0.8M), $NaNO_3$ (0.2M), $NiSO_4.6H_2O$ (0.05M) in 100ml DI water. The electrolyte was agitated at approximately 700 rpm. The pH of the electrolyte was maintained at 1.5. Silver/ silver chloride (Ag/AgCl with saturated KCl) and platinum (Pt) wire were used as reference and counter electrodes respectively. The electrochemical deposition is done cathodically at -0.65V at room temperature for 900s. The obtained nanomaterial was dried at room temperature and then CH_2Cl_2 is poured drop wise for dissolving the polycarbonate membrane for releasing nanowires. After that, the synthesized composite was washed with DI water and dried at room temperature.

3. **Achievements:** The synthesized nanowires were characterized and studied to investigate their physical and chemical properties. The results revealed that the synthesized ppy/Ni nanowires can be a good material for developing supercapacitors.

Dr. Sandeep

4. **Outcome:** Based on this work, a project proposal entitled "Synthesis and characterization of Nickel based nanowires for developing self-charged super capacitors" was framed and submitted to the JK Science Technology and Innovation Council, Union Territory (UT) of Jammu and Kashmir (J&K). The project proposal was approved for funding and an amount of Rs. 9.99 Lakh was sanctioned for a period of 2 years.

UTILIZATION CERTIFICATE

Title of the work : Synthesis and characterization of metallic nanowires as supercapacitors.

Name of the Faculty: Dr. Sandeep Arya

Designation: Assistant Professor

Department: Department of Physics, University of Jammu

Amount Sanctioned: Rs. 1,00,000.00

Amount Utilized: Rs. 94,403.30

Unspent Amount: Rs. 5,596.70

Sanction No. & Date: RUSA/JU/2/2019-20/36/3428-34991 Dated: 05.11.2019

Statement of Expenditure

Funds	Amount allotted (INR)	Spent (INR)	Unspent (INR)
Consumables	Rs. 50,000	Rs. 49,792	Rs. 208
Contingency	Rs. 10,000	Rs. 6,897.30	Rs. 3,102.70
Any Other Head	Rs. 40,000	Rs. 37,714	Rs. 2,286
Total	Rs. 1,00,000	Rs. 94,403.30	Rs. 5,596.70

10/06/2022

Signature of Faculty Member

Assistant Professor,
Department of Physics
University of Jammu, Jammu

10/06/2022

Signature of HoD

Head
P G Deptt. of Physics
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