## **Ongoing projects:**

**1. Title:** Synthesis and study of properties of electrochemically active composites based on lithium intercalated silicates of iron, manganese, cobalt and having high electron conductivity corbosilicides of transition metal

Funding Agency: DST

Completion date: November 2020

Project PI: Ambesh Dixit

Brief description: The project targets to develop high energy density cathode materials and their modification of reversible charge/discharge cycle

Schematics or Pictures:



LFSO electrochemical performance

Outcome: . The capacity fading is a major concern in these materials and we proposed the microscopic origin of capacity fading in high energy density silicate cathode materials.

Publication if any: AV Ivanishchev, NA Gridina, KS Rybakov, IA Ivanishcheva, **A Dixit**, Structural and electrochemical investigation of lithium ions insertion processes in polyanionic compounds of lithium and transition metals, Journal of Electroanalytical Chemistry 860, 113894 (2020) **2. Title**: Development of nanostructured Cu2ZnSn(S/Se)4 thin films and their electronic properties for next generation solar photovoltaic applications

Funding Agency: DST

Completion date: November 2020

Project PI: Ambesh Dixit

Project Co-PI: NA

Brief description: CZTS is a low earth abundant potential material for photovoltaic applications. The project focuses on the synthesis of CZTS material in thin film geometries and their intensive characterization for possible in a heterojunction PV devices.

Schematics or Pictures:



Solar cell assembley with different layers and the corresponding photovoltaic response against the absorber thickness

Outcome: Low cost hihgly robust sol-gel process is developed for CZTS thin film synthesis and complete solar cell device is fabricated on the optimized CZTS thin films. The studied provided the understanding of detailed current transport and interface dynamics. Further, new derivative mateials and their single and tandem junction devices are explored theoretically showing the possiblitiy of achieving high efficiency.

Publication if any:

1. M. Pal, C. J. Diliegros - Godines, G. K. Gupta, N. R. Mathews A. Dixit Structural evolution of chemically deposited binary stacks of Sb2S3 - CuS to phase - pure CuSbS2 thin films and evaluation of device parameters of CuSbS2/CdS heterojunction, International Journal of Energy Research, (2020)

2. GK Gupta, A Dixit. Simulation studies on photovoltaic response of ultrathin CuSb(S/Se)2 ternary compound semiconductors absorber - based single junction solar cells, International Journal of Energy Research 44 (5), 3724-3736 (2020)