

# **RESEARCH AND DEVELOPMENT (R&D) PROJECTS**

Project Title:	<b>Investigating the synergistic effect of 2-D sheet like nanostructuring and alien material incorporation for improved supercapacitor electrode performance of metal chalcogenides</b>
Funding Source:	<b>Science &amp; Engineering Research Board (SERB), Department of Science and Technology (DST), India</b>
Sanction Order No.:	<b>ECR/2017/000879</b>
Sanction Date:	<b>08 October, 2018</b>
Sanction Amount:	<b>Rs. 18,23,501/- (Rs. Eighteen Lakh Twenty Three Thousand Five Hundred and One only)</b>
Duration:	<b>03 (Three) years</b>
Project Investigator (PI):	<b>Dr. Jitendra Gangwar</b>
Project Fellow:	<b>Mr. Piyush Siroha</b>

# RESEARCH AREA

- **Experimental Condensed Matter Physics,**
- **Theoretical Modeling by VESTA software.**



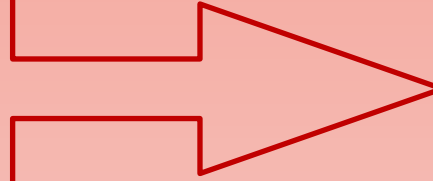
# Equipments Available

## MUFFLE FURNACE

**Make:** Jupiter

**Temperature range:** upto 1500 °C

**Date of Installation:** 02-Feb-2019

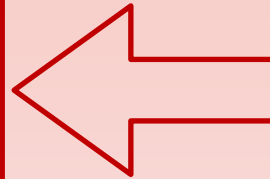


## HOT AIR OVEN

**Make:** Jupiter

**Temperature range:**  
upto 300 °C

**Date of Installation:**  
02-Feb-2019



# Equipments Available

## MAGNETIC STIRRER

**Make:** REMI

**Temperature range:** upto 150 °C

**Revolution per Minute (RPM):** 2000

**Date of Installation:** 29-Apr-2019



## HOT PLATE

**Make:** Jupiter

**Temperature range:** upto 250 °C

**Date of Installation:** 02-Feb-2019

# Equipments Available

## Precision Balance

**Make:** Panacea (A&D Japan Make)

**Model:** FX-300 GD

**Capacity:** 320 gm

**Resolution:** 0.001 gm



## pH meter

**Make:** EUTECH

**Model:** PH tutor - i

**Range:** 0.00 to 14.00

**Resolution:** 0.01

# Chemicals available



## Name of Chemicals

## Quantity

1. Methanol ( $\text{CH}_3\text{OH}$ ) 3L
2. Ethanol ( $\text{C}_2\text{H}_5\text{OH}$ ) 3L
3. Sodium Hydroxide Pellets ( $\text{NaOH}$ ) 500mg
4. Ammonia Solution ( $\text{NH}_4\text{OH}$ ) 2L
5. Hydrazine Hydrate ( $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ ) 500ml
6. Ammonium Molybdate Tetrahydrate ( $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$ ) 500gm
7. Sodium Molybdate Dihydrate ( $\text{NaMoO}_4 \cdot 2\text{H}_2\text{O}$ ) 100gm
8. Aluminium Nitrate Nonahydrate ( $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ ) 500gm
9. Thioacetamide ( $\text{C}_2\text{H}_2\text{NS}$ ) 200gm
10. Polyvinylpyrrolidone ( $\text{C}_6\text{H}_9\text{NO}$ ) 1kg
11. Citric acid anhydrous ( $\text{C}_6\text{H}_8\text{O}_7$ ) 1kg
12. Se Powder (Se) 100gm
13. Tungsten Hexachloride ( $\text{WCl}_6$ ) 100gm
14. Thiourea ( $\text{CH}_4\text{N}_2\text{S}$ ) 500gm

# RESEARCH

Name of Faculty	Research Areas	No. of Publications	Conferences/Seminars	
			International	National
<b>Dr. Davender Singh</b>	Nanomaterials, Solid State Physics and Materials Science	29	08	16
<b>Dr. Jitendra Gangwar</b>	Nanoscience and Nanotechnology	21	10	09
<b>Dr. Jitendra Kumar</b>	Gas Sensor and DNA Replication	08	03	04
<b>Dr. Rajni Bansal</b>	Nanomagnetism and Spintronics	06	05	02
<b>Dr. Jyoti Yadav</b>	Nanoscience and Nanotechnology	10	09	06
<b>Dr. Kavita</b>	Theoretical Nuclear Physics	04	16	00
<b>Mr. Naveen Kumar</b>	Nanomaterials	03	03	02

# Publications

1. **Manjeet Kumar** and Mahesh Kumar Yadav, Enhancement of the Network Life Time by improved Teen Protocol in WSN, *International Journal for Technological Research in Engineering*, **2**, 2636-2638, (2015). Impact factor (I.F.): 4.62.
2. **Rajni Bansal**, N. Chowdhury, and P. K. Muduli, Proximity effect induced enhanced spin pumping in Py/Gd at room temperature, *Applied Physics Letters*, **112**, 262403, (2018). I.F.: 3.495.
3. **Rajni Bansal**, A. Kumar, N. Chowdhury, N. Sisodia, A. Barvat, A. Dogra, P. Pal and P. K. Muduli, Extrinsic spin-orbit coupling induced enhanced spin pumping in few-layer MoS<sub>2</sub>/Py, *Journal of Magnetism and Magnetic Materials*, **476**, 337-341 (2019). I. F.: 3.046.
4. A. Kumar, **Rajni Bansal**, S. Chaudhary and P. K. Muduli, Large spin current generation by the spin Hall effect in mixed crystalline phase Ta thin films, *Physical Review B*, **98**, 104403, (2018). I. F.: 3.836.
5. M. Shahabuddin, A. Sharma, **Jitendra Kumar**, M. Tomar, A. Umar and V. Gupta, Metal clusters activated SnO<sub>2</sub> thin film for low level detection of NH<sub>3</sub> gas, *Sensors and Actuators B: Chemical*, **194**, 410-418 (2014). I. F.: 5.667.
6. **Jitendra Kumar**, M. Shahabuddin, A. Singh, S. P. Singh, P. Saini, S. K. Dhawan and V. Gupta, Highly sensitive chemo-resistive ammonia sensor based on dodecyl benzene sulfonic acid doped polyaniline thin film, *Science of Advanced Materials*, **6**, 1-8, (2014). I. F.: 1.318.
7. R. A. Zargar, S. Chackrabarti, M. Shahabuddin, **Jitendra Kumar**, M. Arora, A. K. Hafiz, Novel composites of Zn<sub>1-x</sub>Cd<sub>x</sub>O (x = 0, 0.05, 0.1) thick films for optoelectronic device application, *Journal of Materials Science: Materials in Electronics*, **26**, 10027-10033, (2015). I. F.: 2.324.



8. **Davender Singh**, V. S. Kundu, R. L. Dhiman and J. Gangwar, Structural and morphological study of zinc doped tin oxide nanoparticles synthesized via sol-gel technique, *AIP Conference Proceedings*, 2006, 030017 (2018).
9. **Davender Singh**, V. S. Kundu, A. S. Maan, Structural, morphological and gas sensing study of zinc doped tin oxide nanoparticles synthesized via hydrothermal technique, *Journal of Molecular Structure*, **1115**, 250-257 (2016), I. F.: 2.011.
10. **Davender Singh**, V. S. Kundu, A. S. Maan, Structural, morphological and gas sensing study of palladium doped tin oxide nanoparticles synthesized via hydrothermal technique, *Journal of Molecular Structure*, **1100**, 562-569 (2015), I. F.: 2.011.
11. **Naveen Kumar**, D. Singh and J. Gangwar. Advanced Applications of Nanostructured Metal Chalcogenides in Clean and Sustainable Environment: Case Study on MoS<sub>2</sub>, *Conference Proceeding: Smart Cities Rural Development and Sustainable Clean Environment*, 93-97 (2019).
12. D. Singh, **Naveen Kumar**, J. Gangwar and P. Kumar, Crystallographic Representation of Polymorphs ZrO<sub>2</sub> using VESTA Software, *AIP Conference Proceedings*, (2019) *Accepted*.
13. I. Singh, D. Singh, J. Gangwar and **Naveen Kumar**, Crystallographic representation of different transition metal oxides polymorphs using VESTA Software: Case study of TiO<sub>2</sub> and ZrO<sub>2</sub>, *Conference Proceedings*, International Conference on Materials for Energy Applications, 100-101 (2018).
14. Piyush Siroha, D. Singh, R. Soni, **Jitendra Gangwar**, Comparative study on crystallographic representation of transition metal oxides polymorphs nanomaterials using VESTA software: Case study on Fe<sub>2</sub>O<sub>3</sub> and TiO<sub>2</sub>, *AIP Conference Proceedings*, **2006**, 030038 (2018).
15. R. Verma, **Jitendra Gangwar** and A. K. Srivastava, Multiphase TiO<sub>2</sub> nanostructures: a review of efficient synthesis, growth mechanism, probing capabilities, and applications in bio-safety and health, *RSC Advances*, **7**, 44199-44224 (2017). I. F.: 2.936.
16. **Jitendra Gangwar**, B. K. Gupta, S. K. Tripathi and A. K. Srivastava, Phase dependent thermal and spectroscopic responses of different morphogenesis of Al<sub>2</sub>O<sub>3</sub> nanostructures, *Nanoscale: Review Article*, **7**, 13313-13344, (2015). I. F.: 7.233.