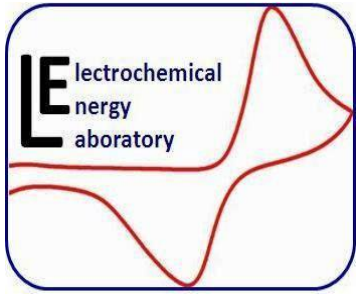
Energy Storage

Group Head: Prof. Sagar Mitra



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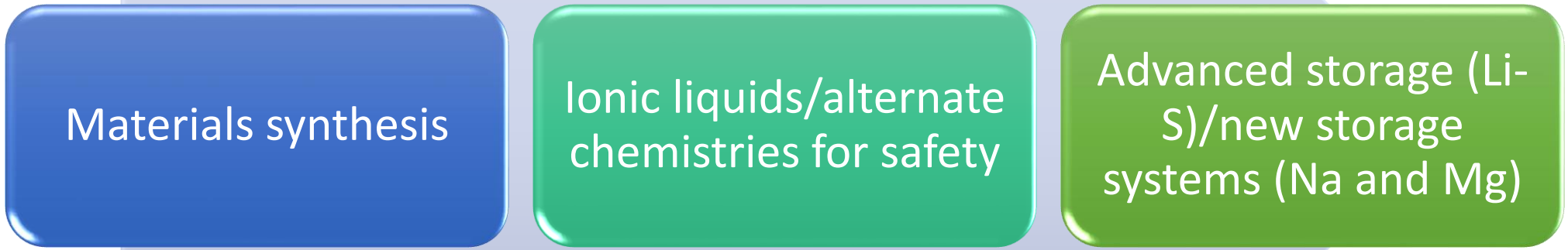
Research Objectives:

- Sustainability
- Low cost solutions
- Safe battery storage
- High energy density battery pack

Towards next generation battery technologies



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Research Activities:

Lithium-ion batteries:

- ✓ Synthesis of high capacity cathode and anode materials
- ✓ Performance optimization
- ✓ Development of new cell chemistries
- ✓ Ionic liquid based electrolytes

Lithium-Sulphur batteries:

- ✓ Waste to sustainable energy

Sodium-ion batteries:

- ✓ Development of cathode and anode materials
- ✓ Performance optimization
- ✓ Ionic liquid based electrolytes

Magnesium-ion batteries:

- ✓ Development of magnesium-ion batteries

Lithium-ion batteries for Renewable energy integration in the state of California, US

www.energy.ca.gov/research/energystorage/tour/lion/

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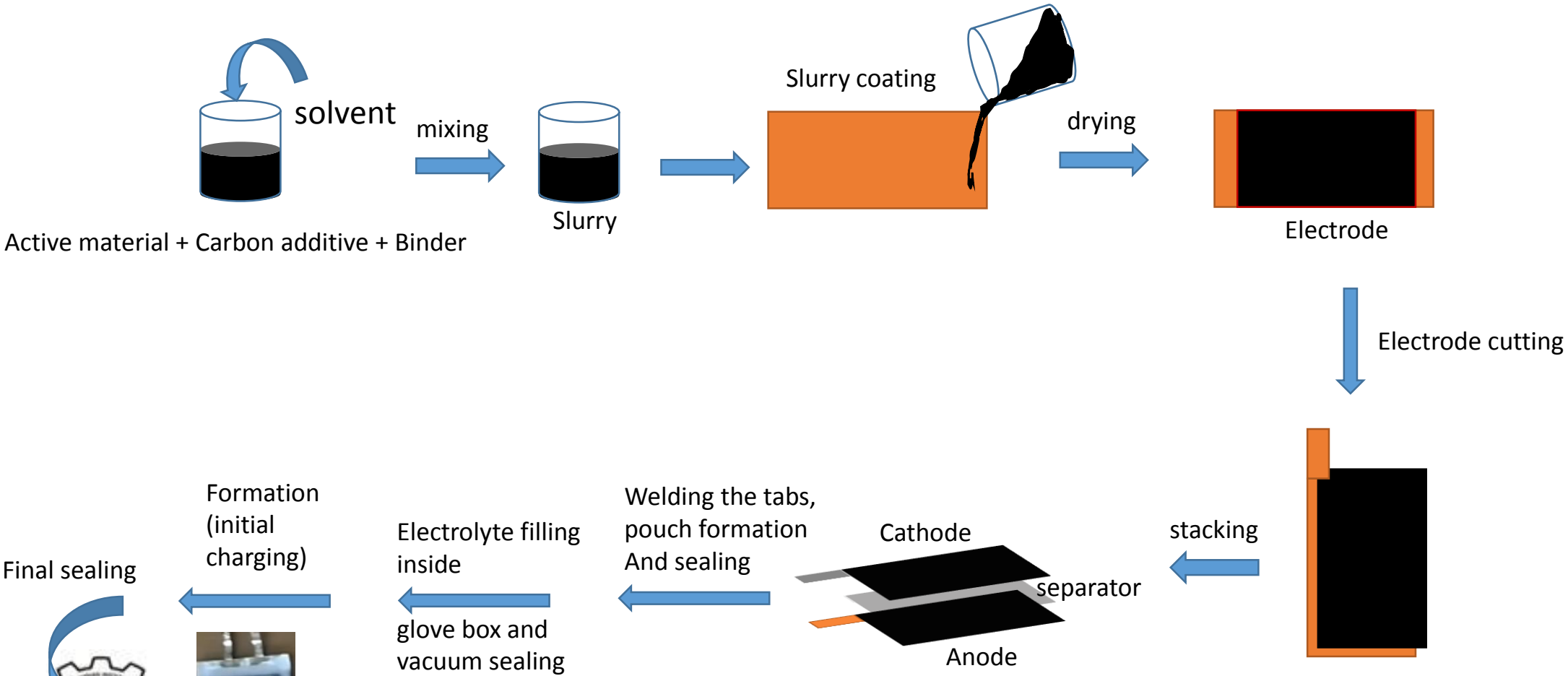
Commercial grade battery production:



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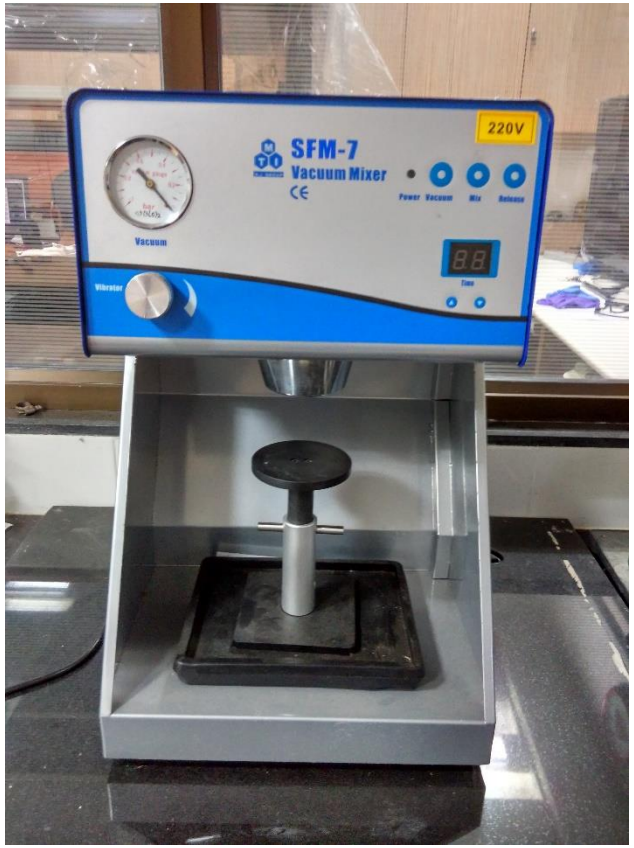
Lithium-ion pouch cell fabrication unit:



Electrode slurry mixer

Electrode slurry coater

Electrode die cutter

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Lithium-ion pouch cell fabrication unit:

Calendaring machine

Pouch forming machine

Pouch sealing machine

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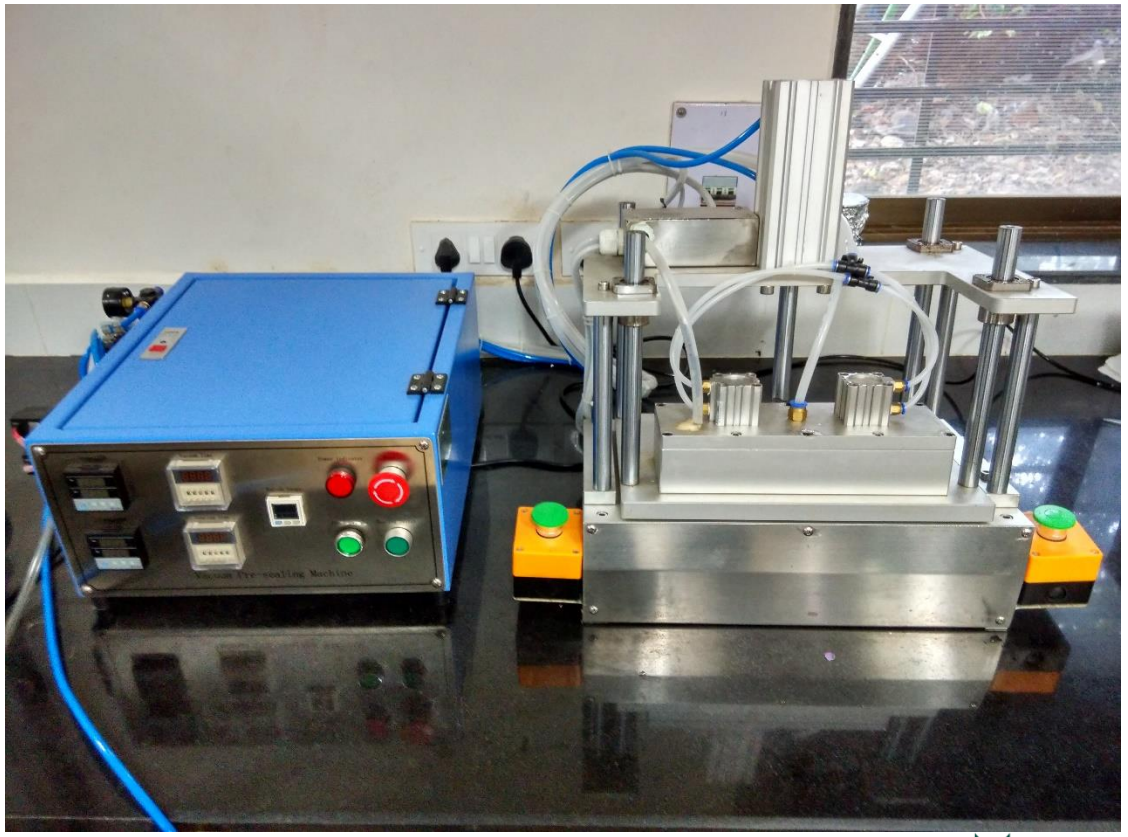
Lithium-ion pouch cell fabrication unit:

Pouch stacking

Ultrasonic welding



Vacuum sealing machine

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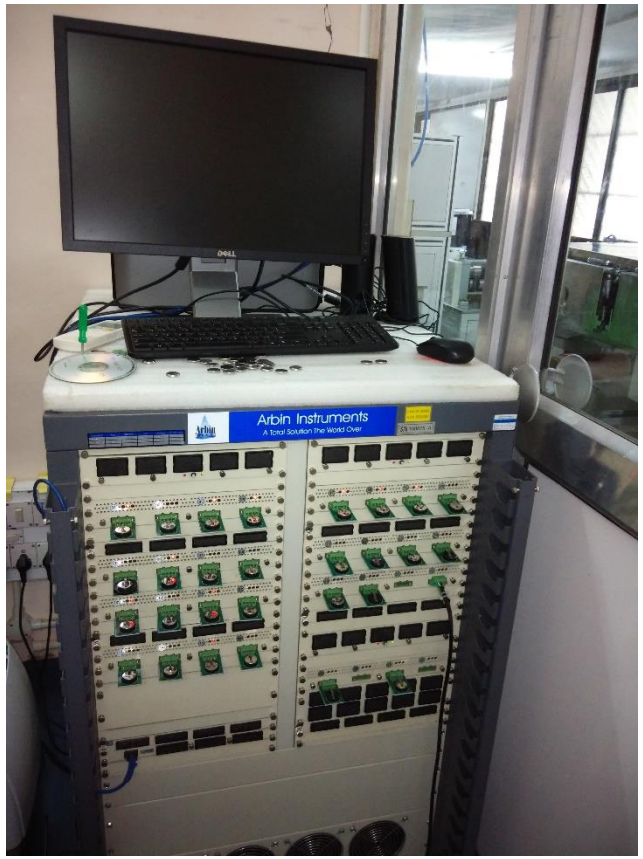
Lithium-ion pouch cell fabrication unit:

Glovebox for electrolyte filling



Battery testing machine

Lithium-ion pouch cell

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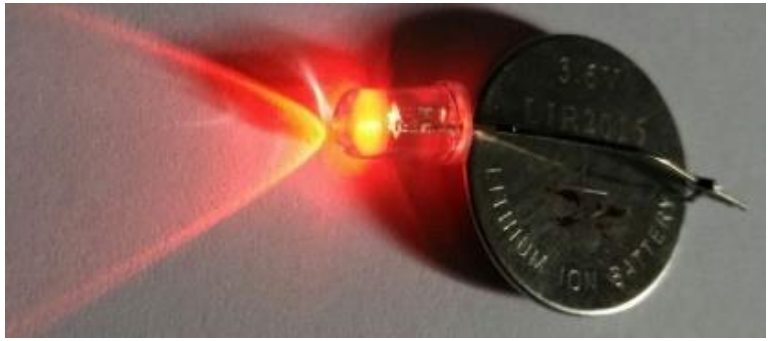
Development of new Lithium-ion chemistry: Fe_2O_3 as conversion anode



Single LED powered by 2016 coin cell

Study lamp powered by a pouch cell

50 ultra bright LED array powered by pouch cells

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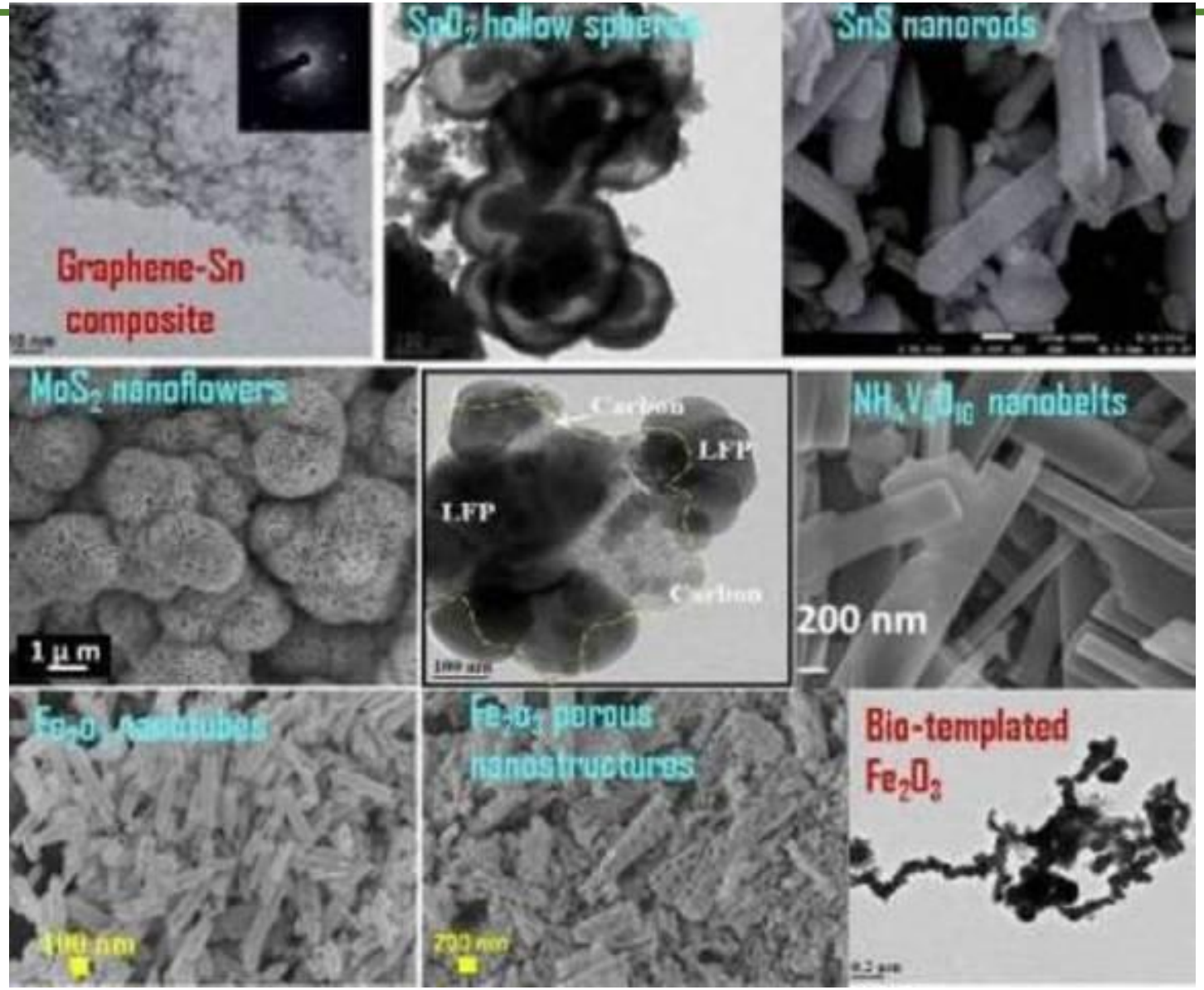
Nanostructured materials for energy storage: Sn-based, MoS_2, Fe_2O_3, LFP, NVO



- ✓ Synthesis through various methods
- ✓ Nanostructured materials reduces the diffusion path length for lithium-ions
- ✓ Enhances the capacity retention at high rates

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NCPRE Phase 2 targets:

- 2.5 Ah pouch cell/18650 cylindrical cell
- 0.6 Ah Na-ion battery
- Modelling for large format cells

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