

International Webinar on 'Novel ways to improve Li-ion batteries'

05-12-2020

The Department of Physics, St. Joseph's College (Autonomous) Irinjalakuda conducted an International webinar 'Novel ways to improve Li-ion batteries' on 5th December, 2020 at 6 pm in the evening via Google Meet. It was organised in association with the Research Cell of the college.

The webinar commenced with the Head of the Department, Ms. Mary Gisby Poulouse welcoming the gathering. Dr. Benoy Anand, Assistant Professor in Physics introduced the resource person of the day, Prof. Apparao M. Rao to the participants. **Prof. Apparao M. Rao, R. A. Bowen Professor of Physics, Department of Physics & Astronomy, Director- Clemson Nanomaterials Institute, Clemson University, South Carolina, USA** delivered an invited lecture on the topic 'Novel ways to improve Li-ion batteries'.

The session began with Prof. Apparao explaining the need and benefits of storage batteries in the present scenario. The lecture highlighted the recent advances in Lithium ion batteries and the relevance of green energy solutions in today's world. He also spoke about how diffusion length and mobility of charge carriers change when structure changes from 3D to quantum dots.

Around 120 participants-students, research scholars and faculty members- from various colleges and universities all over India participated in the webinar. Towards the end of the session, the resource person shared his experiences on how to prep oneself for a career in Research and how research is actually wide-ranging, rewarding, stimulating and engaging.

At the end of the talk, the participants were invited to share their questions and they had an interactive session with Prof. Apparao. The participants also gave a very good feedback about the webinar and about the conduct of the programme. At the end, third year undergraduate student Lakshmy K. offered the vote of thanks to formally conclude the session. All the participants were provided with e-certificates for participation.

Grand Challenge

EV Everywhere

Vehicle electrification as an essential part of USA's energy strategy

LIB provides the highest energy density of all commercially available battery chemistries

Temperature (-45 to 60 °C)
 15 mins to 80% charge
 > 20%
 Cost (\$125/kWh)
 Cycle life (1000 cycles)
 Life (15 years)
 Specific Energy (235 Wh/kg)
 Energy density (500 Wh/l)

3 goals identified by the U.S. Advanced Battery Consortium



Lithium ion battery

Discharge

Charge Meter

ENERGY STORAGE EFFICIENCY & RENEWABLE ENERGY

- Both the **cathode** (layered LiCoO₂ or LiFePO₄ are most widely used) and **anode** (graphite) are stable in air and enabled the large-scale manufacturing of LIBs in the early 1990s. Nobel Prize in Chemistry in 2019
- **Separator** - Celgard® (microporous separator made of both polyethylene and polypropylene)
- **Electrolyte** (lithium salt [LiPF₆] in organic solvents (ethylene carbonate))

