Nanostructured lithium cobalt vanadate as electrode material for supercapacitors

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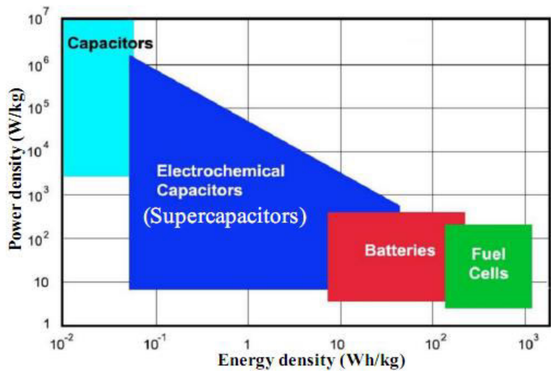
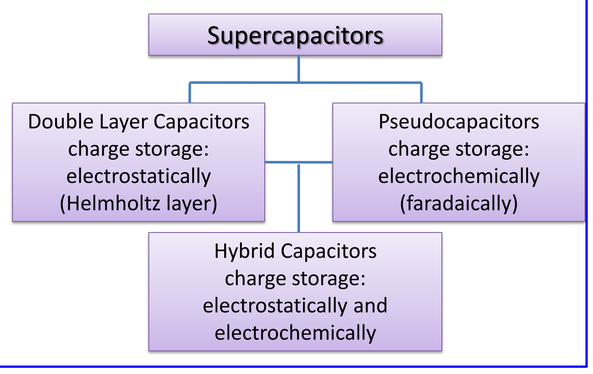
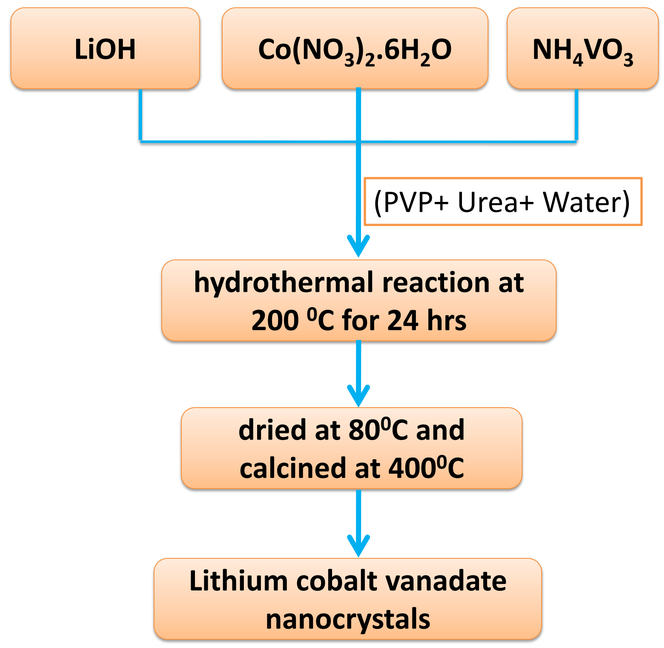
Introduction

- Capacitive energy storage has the advantage of delivering high power in comparison to batteries which store relatively more energy.
- Also supercapacitors have shorter charge/discharge time and longer cycling life.
- Because of multiple processes acting to store charge, the capacitance values are higher in pseudocapacitors.
- Here we propose a facile synthesis of nanocrystalline lithium cobalt vanadate for the first time for energy storage application.

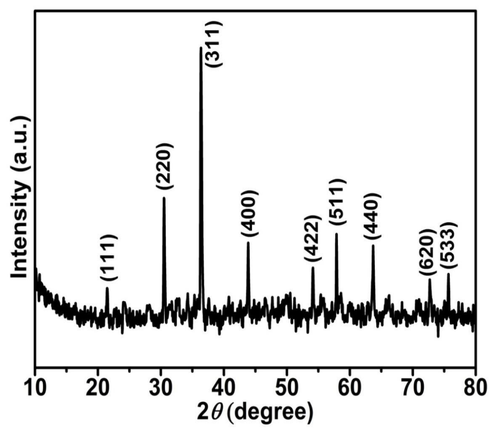




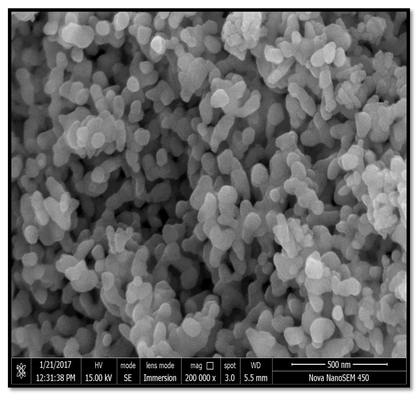
Experimental



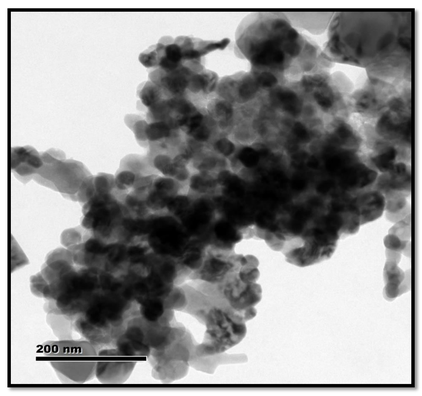
Results and Discussion



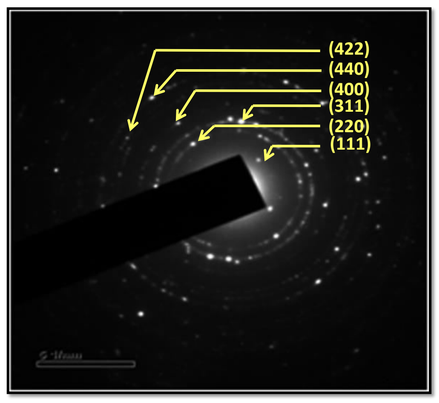
XRD spectra



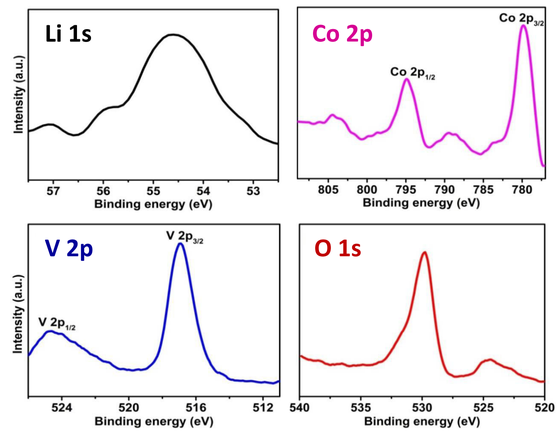
SEM micrograph



TEM image

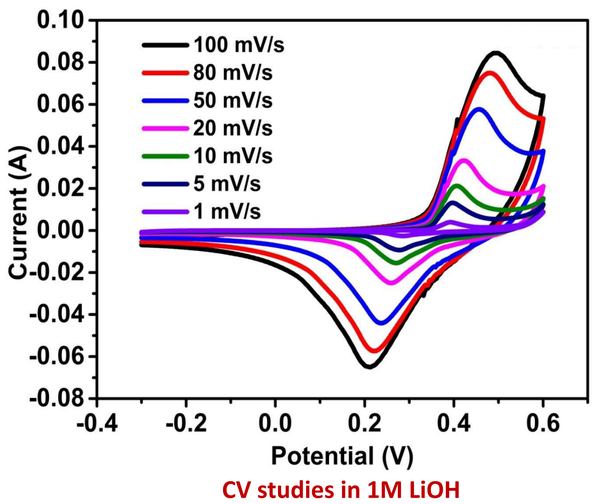


SAED pattern

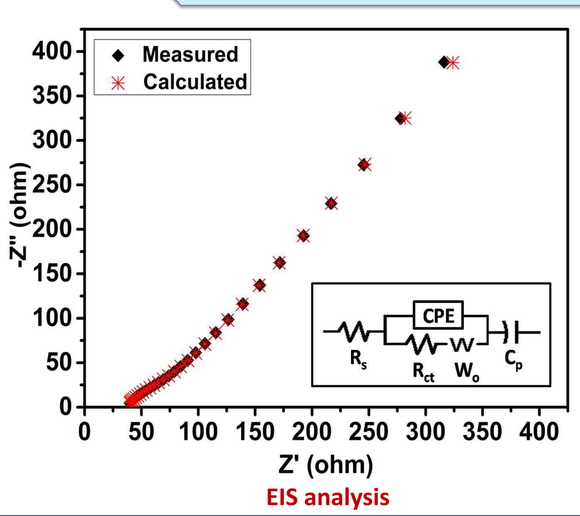


XPS analysis

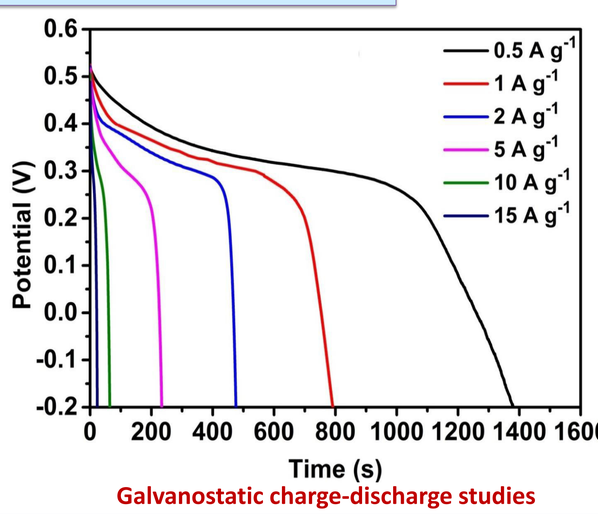
Electrochemical Evaluation



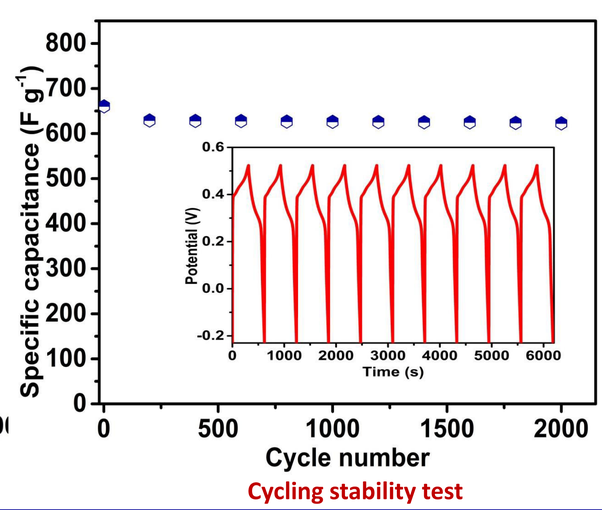
CV studies in 1M LiOH



EIS analysis



Galvanostatic charge-discharge studies



Cycling stability test

Conclusion

- Here we report a facile and hydrothermal method to synthesize Lithium cobalt vanadate nanocrystals for the first time for energy storage application.
- $LiCoVO_4$ nanocrystal electrode demonstrated an excellent specific capacitance of 967.98 F g^{-1} at current density of 0.5 A g^{-1} .
- Also excellent capacitance retention of ~99% obtained at 1 A g^{-1} even after 2000 continuous charge-discharge cycles.
- This study essentially offers a new kind of metal vanadium oxides as electrochemical active material for the development of supercapacitor devices.

Reference

- Y. Wang, Y. Song, and Y. Xia, *Chem. Soc. Rev.*, 2016, 45, 5925–5950.
- H. Haritha, R. Chulliyote, Mary Gladis J., *J. Solid State Electrochem.* 2017, 1–9.

Acknowledgement

Authors acknowledge IIST, Thiruvananthapuram for funding