Synchronizing Process and Crystal Engineering to Harness Power and Energy

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There is a rich and long history of gaining inspiration from various self assembled natural and synthetic materials. Interestingly, essential of the applied materials science lies in the availability of high-quality materials that demonstrate explicit properties and can be obtained through an appropriate manufacturing technique in large scale. Although there is sound progress in materials science, there still exists a serious discrepancy in the ability to produce solids with preferred built-in properties by both rational design and synthesis. It has also been observed that the same material behaves differently in diverse particle dimensions, like from bulk and micron to nano. Therefore, the structure and process engineering play an important role tuning desired properties, especially in battery industry. Questions relating to the prediction of the crystal structure of a given cathode or anode material may be more gainfully reversed where a posteriori analysis of a target structure can leads to the identification of molecular precursors that help developing future materials. This may ultimately serve as a blue print for the crystal engineering, so can this help in particle engineering.

Major objective of the current presentation is to demonstrate a fundamental understanding of crystal engineering, which would be gracefully combined to the particle engineering in order to develop better performing consistent battery materials. Emphasis would also be placed to systematically investigate the material analysis in real time using synchrotron X-ray beam.