

SL -4

## Smart Materials via Ionic Liquids

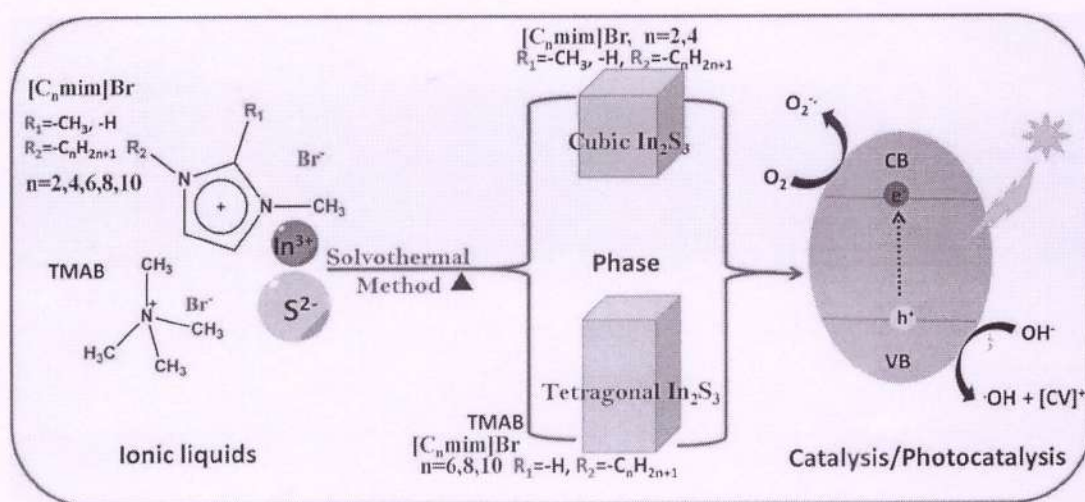
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### Abstract

In my research group, we are developing Ionic Liquid (IL) based green synthesis to prepare next generation phosphor materials for energy efficient and environmentally lighting; rare-earth based optoelectronic materials with improved property or property combinations. Here we are not only using ionic liquids as templating agent, solvent but also sometimes as a reaction partner i.e. three in one. In addition, we are also developing new generation semiconducting materials for removing toxic dyes released to the water bodies by industries specially textile industries. Keeping in mind about the fascinating applications of our "smart" materials our endeavor is also to unravel the structure property relationship controlled by tuning ionic liquid properties. Brief of the two topics which will be discussed here are given below.

Herein, phase tuned quantum confined  $\text{In}_2\text{S}_3$  nanocrystals prepared solvothermally using task-specific ionic liquids (ILs) as structure directing agents are reported. Selective tuning of size, shape, morphology and, most importantly, crystal phase of  $\text{In}_2\text{S}_3$  is achieved by changing the alkyl side chain length, the H-bonding and aromatic  $\pi$ -stacking ability of the 1-alkyl-3-methylimidazolium bromide ILs,  $[\text{C}_n\text{mim}]\text{Br}$  ( $n=2,4,6,8$  and  $10$ ). In addition it is noticed that, source of sulphur precursor and their concentration plays a pivotal role to obtain the phase pure materials. It is observed that crystallite size is significantly less when ILs are used compared to the synthesis without ILs keeping the other reaction parameters same.



Scheme 1: Ionic liquid based synthesis of  $\text{In}_2\text{S}_3$  nanocrystals and degradation of dye molecules.

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