

# Novel Solvothermal Synthesis of Environmental Responsive Inorganic Functional Materials

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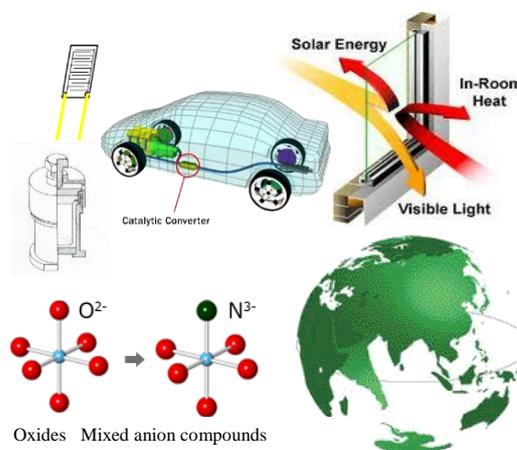
## Abstract.

Solvothermal synthesis has become a promising method for functional material synthesis, because of the possibility for producing nano-size crystals with soft agglomeration, and controlling the phase composition or morphology by optimizing reaction conditions. The existence of water molecules during the solvothermal reaction has a great effect on the morphology, crystalline growth and agglomeration of the product particles. In this talk, a novel synthesis process named water molecular controlled-release solvothermal process (WCRSP) will be introduced. Various kinds of nanomaterials, such as anion doped visible light induced photocatalysts, semiconductor oxides gas sensor materials, transparent conductive oxides (TCOs), mixed valence state oxide based UV/IR shielding materials and automobiles three-way catalysts etc., with different morphologies and particle size, will be introduced. Figure 1 shows the illustration image of various applications of the inorganic nanomaterials prepared by environmental friendly solvothermal process.

The composites consist of high-sensitive anion doped photocatalysts and up-conversion / long afterglow phosphors possess excellent deNO<sub>x</sub> photocatalytic activity under UV/visible/NIR light irradiation, or even after turning off light irradiation. Also, a series of A<sub>x</sub>WO<sub>3</sub>/BO<sub>x</sub> (A = K, Cs, Rb, NH<sub>4</sub>; B = Zn, Ti) nanocomposites are proposed for the fabrication as multifunctional smart coating, which show the potential applications as heat insulation, photodecomposition of toxic NO gas, blocking of harmful UV light, and self-cleaning coating etc.. Significant contributions are expected in the future for the development of multifunctional inorganic nanomaterials by the novel solvothermal reactions<sup>[1-2]</sup>.

## References

- [1] S.YIN\*, Creation of Advanced Optical Responsive Functionality of Ceramics by Green Processes, *J.Ceram.Soc.Jpn.*, **123**, 823-834, 2015;
- [2] S.YIN\* et al., Recent Progress on Mixed-anion Type Visible-Light Induced Photocatalysts, *Science China Technological Sciences*, **60**, 1-11, 2017.



**Fig.1** Illustration image of various applications of the inorganic nanomaterials prepared by environmental friendly solvothermal process