

Synthesis of Advanced Nanophotocatalysts using Supercritical Milli/Micro-Reactor

Ravi Anusuyadevi Prasaanth, Cyril Aymonier, Samuel Marre*

CNRS, Univ. Bordeaux, ICMCB, F-33600, Pessac Cedex, France
samuel.marre@icmcb.cnrs.fr

ABSTRACT

In heterogeneous photocatalysis, nanocomposites exhibit several advantages from their capacity of extended light absorption and their appropriate band edge potentials allowing performing numerous reactions. The uniformity of synthesis environment required to provide reproducible nanocomposites with high crystalline and stable properties are the current prerequisites of the Photo-Chemist and Chemical Engineers. In this context, continuous supercritical processes milli/micro reactor have proved to be performant tools thanks to enhanced heat & mass transfer for synthesizing quantum confined nanomaterials with high yield.

In this talk, the first section will highlight the synthesis of GaN quantum dots (QDs) using a supercritical milli-tubular reactor working with hexane using two different process techniques (co-flow and pre-heater). We will detail the process employed and provide the advantageous features of the pre-heater approach and the reasons for opting it over co-flow technique. The GaN nanomaterial is active in the UV region, the subsequent work of this presentation will focus on the synthesis of $\text{Ga}_x\text{In}_{1-x}\text{N}$ solid solution nanomaterial by introducing InN (active in the IR region) in GaN crystalline domain using double source precursors in a supercritical mixture. This solid solution rendered the materials active in the visible region. The talk will eventually provide insight in combining such materials with Titania (TiO_2) for creating a nanocomposites resulting in a type II heterojunction and some demonstration of photocatalytic reactions performed with them.