

Crystallinity and Photoluminescence Improvement of
YAG:Ce Phosphor Ceramics by Solid State Reaction with
Silica Addition

Yung-Tang Nien

Department of Materials Science and Engineering,
National Formosa University
64 Wunhua Rd, Huwei Township, Yunlin County 632,
Taiwan

Phosphor ceramics of $Y_3Al_5O_{12}$:Ce (YAG:Ce) were prepared by a solid state reaction method of powder firing and bulk sintering at 1500°C for 12h and 24h, respectively, which were also added with various amounts of silica (SiO_2 , 0~10wt%) at different heat treatment stages to improve their crystallinity and photoluminescence property. The adding processes included a mixture of raw materials of Y_2O_3 , Al_2O_3 , SiO_2 , $Ce(NO_3)_3$ (process A) prior to powder firing, a mixture of intermediate materials of $Y_3Al_5O_{12}$:Ce, SiO_2 (process B) prior to bulk sintering, and a combination of the above processes (process C). The results of photoluminescence and quantum efficiency indicated that the process B was superior to the other processes. This improvement was ascribed to the sufficient eutectic reaction of $Y_3Al_5O_{12}$:Ce and SiO_2 with less reaction energy and fewer impurities compared to process A and process C, respectively. Details of experiment processes, results and discussion will be presented in the meeting.