Synthesis and characterization of MgAl₂O₄ and (Mg_xZn_{1-x})Al₂O₄ mixed spinel phosphors Wael A. I. Tabaza



The research project consisted of five main experimental points:

- To prepare $MgAl_2O_4$ and the mixture of $Mg_xZn_{1-x}Al_2O_4$ powder by combustion method.
- To enhance the emission from 4f-5d transition by using the mixture of spinel $Mg_xZn_{1-x}Al_2O_4$:Tb phosphor.
- We consider adding Ce and Bi as sensitizers to improve the Tb emission in this host
- To study the energy transfer from Ce to Tb in MgAl₂O₄ in order to possibly enhance the emission of Tb³⁺. Because the results showed that Ce doped MgAl₂O₄ is difficult to prepare and its emission is weak, the energy transfer from Bi to Tb in MgAl₂O₄ was additionally investigated as a possible alternative.
- To prepare $Mg_xZn_{1-x}Al_2O_4$: Tb thin films by spin coating technique and by PLD technique .



Figure 1: AFM images of the surface of Mg_xZn_{1-x}Al₂O₄: Tb thin films as prepared (a) spin coating (b) pulsed laser deposition (PLD)



Figure 2: Room temperature excitation spectra of Mg_xZn_{1-x}Al₂O₄ measured with the Cary Eclipse.