Study of nano powder and thin film phosphors.

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A phosphor is a luminescent material usually in the form of powders but in some cases, thin films prepared from a wide-band gap material that is doped with impurities to obtain emission of a particular wavelength. Generally thin film phosphor materials have some advantages over powders depending on applications. These include the reduction of light scattering, reduced outgassing, homogeneous or stoichiometric distribution of materials across the covered area with higher lateral resolution and contrast due to smaller grains, better thermal stability and better thermal contact or adhesion to solid substrates. Growing thin films can be achieved via several techniques which include metal-organic chemical vapour deposition (MOCVD), chemical vapour deposition (CVD), chemical bath deposition (CBD), metal organic vapour-phase epitaxy (MOVPE), successive ionic layer adsorption and reaction method (SILAR), molecular beam epitaxy (MBE), Atomic Layer Epitaxy (ALE) and pulsed laser deposition (PLD). The PLD technique has advantages over other methods because it is a pure physical process enabling stoichiometric transfer of the target material, production of quality plume of high energy species, thermal reaction between the ions and O_2 in the plasma and compatibility with ambient pressures ranging from UHV to 100 Pa. Disadvantages of PLD are roughness due to surface particles and poor film uniformity. In this study properties of Yttrium Aluminium Garnet (YAG) commercial phosphors doped with Ce^{3+} and separately co-doped with Ga^{3+} and Gd^{3+}, $SrAl_2O_4$:Eu^{2+},Dy^{3+} /Nd^{3+} and also $BaAl_2O_4$:Eu^{2+},Dy^{3+} /Nd^{3+} both in powder and thin film forms are investigated to find the optimal conditions under which these materials exhibit best performance for industrial applications such as surface coatings and device fabrication.

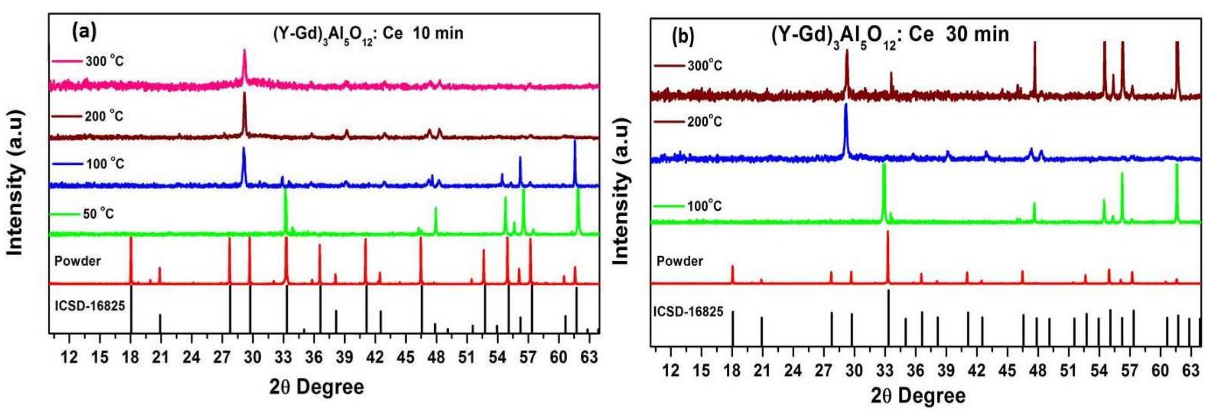

Figure 1(a and b): The XRD spectra of the (Y-Gd)$_3$Al$_3$O$_{12}$ Ce thin films under different temperatures and deposition time.