Luminescent characteristics of polyethylene terephthalate (PET) thin films deposited by spray pyrolysis using rare earths (RE^{3+}) as dopants.

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Structural and luminescent characteristics of rare earths-doped polyethylene terephthalate (PET) thin films deposited by ultrasonic spray pyrolysis technique are reported. The films were deposited on crystalline silicon, quartz and glass substrates, at temperatures from 200 to 300 ^{0}C using a chemical solution of granulated PET and RE^{3+} (terbium, cerium, dysprosium and europium), as precursors, dissolved on N.N-dimethylformamide and diethylene glycol respectively.

The thickness of the films was around 2.5 µm films showed a deposition range of ~ 52 to 80 Å/s. Luminescence spectra peaks observed are associated with interlevel transitions within the electronic energy states of Ce^{3+}, Tb^{3+}, Dy^{3+} and Eu^{3+} ions from their excited states 5d to the split ground state 4F. Blue, green, red or white high emissions are achieved, on function of the rare earth dopants or combinations of them used at thin films deposition.

Emissions intensity behavior of photoluminescence depends of doping concentration and deposition temperature. The luminescence intensity had a maximum when the films were deposited at 240 ^{0}C in every chase, but using different concentrations of RE^{3+} (~0.025 to 4%) in solution.

The surface morphology and the root mean square surface roughness for PET:RE^{3+} thin films were determined by Atomic Force Microscopy. In addition, infrared and UV-Vis spectra, Scanning Electronic Microscopy images and EDS chemical composition results were also shown.

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