PERFORMANCE OF TiO2:Sm3+ BASED OPTICAL SENSOR EMBEDDED IN POLYMER FILMS

Taavi Tikk[1](presenting author), Sven Lange[1], Marko Eltermann[1]

Institute of Physics, University of Tartu, Ostwaldi tn 1, Tartu, Estonia

taavitikk@gmail.com

The present work´s topic is to incorporate inorganic, low cost and remotely readable trace oxygen sensor into industrial polymer packagin material with the aim to help detect package inside atmosphere instabilities after package sealing. The sensing material used is photoluminecent Sm3+ ion doped TiO2 nanoparticle powder prepared via sol-gel technique. The intensity of Sm3+ photoluminesence spectra in TIO2 has been shown to be greatly influenced by its surronding ambient oxygen concentration. By incorporatin the latter into polymer film is expected to enable remote sensing of the local oxygen concentration in the film.

The first aim of the work is to show proper dispersability of the oxide nanoparticles within the polymer and its ability to retain PL modulation depending on the the ambient oxygen changes through the polymer film matrix. The dispersion of the nanoparticles is achieved via hot-pressing technique that closely resembles different hot melt techniques used in industrial packaging material preparation.

Several samples with 1%wt TiO2:Sm3+ nanoparticles were made with different thickness to see if there is any change in signal strength or sensitivity due to changes in oxygen and moisture exposure to the nanoparticle surface.

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