Rare earth based silica-phosphate glass phosphors

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Optical based sensor devices with remote interrogation are particularly advantageous for operation in thermally or electromagnetically harsh environments where typically electronic sensor devices fail. The fabrication of such devices requires the development of new materials and a deep knowledge of its physical properties. Hosts with high chemical durability and thermal stability as silica-phosphate glasses are among the most promising materials for the large scale production of the aforementioned low cost luminescence-based physical sensors. Being environmentally inert, nonconductive, nonmetallic, and chemically resistant, this type of sensors should be able to operate in adverse and corrosive environments. The sensor's dielectric construction, providing immunity to electric and magnetic fields, makes it ideal for applications where high DC, RF, and microwave fields or high voltages are present, as in the proximity of transmission antennas, high power lines and in electrically-noisy environments.

The presented work is focused on rare earth (RE) doped silica-phosphate glasses prepared by a wet non-conventional quenching method. The obtained results points to a high potential of these materials for the application in the mentioned optical devices.

Remote temperature sensors are technological important and these glasses present a good host for the co-doping with RE and use their emission characteristics for remote detection of temperature, based on the fluorescence intensity ratio technique. We are now start developing these type of sensors in cooperation with our I3N partners from CENIMAT (FCT, Universidade Nova de Lisboa) and, from Romania, the National Institute for Research and Development in Optoelectronics.

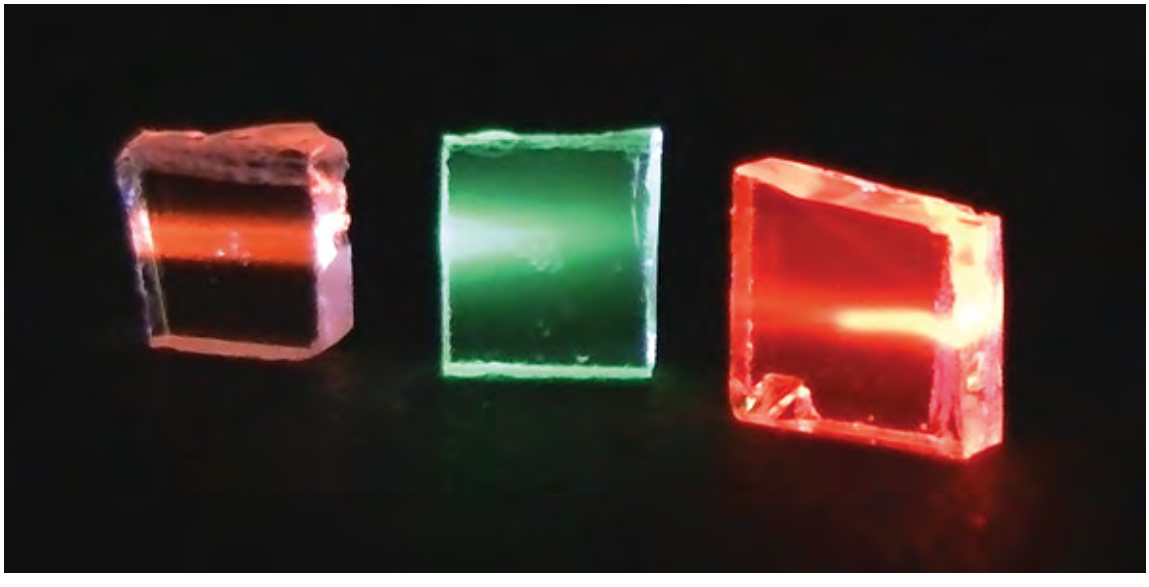

FIGURE 1
RT luminescence of the silica-phosphate glasses doped with distinct lanthanides.

1 - Optically activated Dy^{3+}/ Eu^{3+} ions in a co-doped aluminophosphate oxide host, 13th European Vacuum Conference and 7th European Topical Conference on Hard Coatings, 8-12 September 2014, Aveiro, Portugal
2 - Eu^{3+} luminescence in aluminophosphate glasses, Journal of Luminescence, 145 (2014), 582–587
3 - Effects of ultraviolet excitation on the spectroscopic properties of Sm3+and Tb^{3+} doped aluminophosphate glasses, Optical Materials, 35, 12 (2013) 2382–2388