XXII B-MRS Meeting 2024

September 29th to October 3rd

PROCEEDINGS

Sociedade Brasileira de Pesquisa em Materiais

Proceedings of the XXII B-MRS Meeting

Santos, SP 2024

Conteúdo, revisão textual e gramatical: Resposanbilidade dos respectivos autores.

ISBN: 978-85-63273-63-5

In-situ growth of lanthanide metal-organic frameworks (Ln-MOFs) on oxide glass and optical fibers: a promising material for chemical sensing

Danilo Manzani[1], Francis Rivas Garcia[1], Renato Grigolon Capelo[1]

[1]Instituto de Química de São Carlos -USP (*Departamento de Química e Física Molecular*)

e-mail: dmanzani@usp.br

Owing to their intrinsic porosity and luminescent properties, lanthanide metal-organic frameworks (Ln-MOFs) have emerged as a promising material for chemical sensing. However, these applications usually demanded their deposition in a stable substrate with suitable chemical and physical properties. Thus, this work aims to present a simple, fast, and in situ synthesis and coating process of Ln-MOFs on oxide glass substrates. Pieces of tellurite glasses were coated by different Ln-MOFs containing carboxylate ligands complexed Eu(III) and Tb(III). The synthesis was performed by solvothermal method in microwave equipment, with glass samples inside the reactor to promote the in-situ growth of Ln-MOFs on the substrate's surface. Also, tellurite optical fibers were coated by Ln-MOFs using a hotplate and immersing only the end of the fiber (around 2–5 cm) in the Ln-MOFs precursors solution. The main results indicate the growth of different crystalline structures depending on the glass composition, with different amounts of fluoride ions, indicating the existence of chemical interactions between the glass surface and the Ln-MOF components. Moreover, the luminescent behavior shows thin and well-defined f-f electronic transitions of Eu(III) and Tb(III) ions and a significant energy transfer by the “antenna effect” mechanism. Finally, optical fibers coated with homogeneous, stable, and luminescent Ln-MOF films were obtained, representing a high-potential material for remote chemical sensing.