

## Novel $Y^{3+}$ , $Sm^{3+}$ , $Eu^{3+}$ , $Gd^{3+}$ and $Tb^{3+}$ complexes with 2-(1H-1,2,4-Triazol-3-yl)pyridine and their remarkable photoluminescent properties

Corneliu S. Stan<sup>\*1</sup>, Cristian Peptu<sup>2</sup>, Marcel Popa<sup>1</sup>, Daniel Sutiman<sup>1</sup>, Petronela Horlescu<sup>1</sup>

1. Faculty of Chemical Engineering and Environmental Protection, Gh. Asachi Technical University, 73 D. Mangeron, 700050, Iasi, Romania

2. Institute of Macromolecular Chemistry Petru Poni, Aleea Grigore Ghica Voda 41A, 700487 Iasi, Romania

**Abstract:** In this work, 2-(1H-1,2,4-Triazol-3-yl)pyridine was investigated as suitable ligand for preparation of new  $Y^{3+}$ ,  $Sm^{3+}$ ,  $Eu^{3+}$ ,  $Gd^{3+}$  and  $Tb^{3+}$  complexes. The complexes were prepared at 1/3 metal to ligand ratio and elemental analysis, mass spectrometry, thermal analysis, FT-IR and P-XRD methods were used to investigate their structural configuration. All the prepared complexes are highly luminescent, with an impressive visual emission under UV excitation. Fluorescence spectrometry revealed in case of  $Sm^{3+}$ ,  $Eu^{3+}$  and  $Tb^{3+}$  complexes intense metal centered specific narrow band emissions from the  $f-f$  transitions within  $4f$  orbitals, while in case of  $Gd^{3+}$  and  $Y^{3+}$  complexes intense wide band emissions were recorded most probable due the heavy atom effect over the excited intraligand states. The excitation peaks are conveniently located in UV-A region for all prepared complexes with the exception of Sm(III) complex where the excitation peak is located within the violet region of the spectrum. The remarkable luminescent properties may recommend these complexes for applications in optical devices, as photonic conversion mediums.