Study of Structural and Photoluminescence Properties of Ho-Based Metal Organic Frameworks (Ho-MOFs) and Potential Application as Phosphor Materials for Nanofiber-Based OLEDs

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Since the beginning of the 21st century, the design and fabrication of metal organic frameworks (MOFs) have gained great importance among scientists. The main reason for this interest can be listed as follows: they have an interesting topological structures and their potential applications in magnetism, gas storage or separation, sensors, optics and catalysis [1-3]. When metal organic frameworks are examined within themselves, it can be said that coordination polymers containing lanthanides (Ln-MOFs) have been recently studied extensively because of their characteristic luminescence properties within these potential applications such as analytical sensor, OLED technology and fiber amplifiers [4,5]. Among all Ln-MOFs, the Ho-MOFs are important luminescent activators because they exhibit many strong sharp emission peaks in the visible and NIR region.

In this work, a new 3D lanthanide (III) metal organic framework, $\{[Ho(SSA).2(H_2O)].(H_2O)\}_n$ (**1)** has been synthesized by using hydrothermal techniques. Structural and detailed solid state photoluminescence analysis of the Ho-MOFs compound in the visible (UV-Vis) and near infrared (NIR) regions was performed in this study. The solid-state photoluminescence measurements show the characteristic luminescence of Ho-MOFs which is due to efficient energy transfer from the 5-SSA ligands to the central Ho(III) ions via an ‘‘antenna effect” [6]. In addition, Ho-MOFs compounds will be homogeneously dispersed in PAN and PMMA polymer fibers using electrospinning process to obtain the nano-scale structure as Ho-MOFs@PAN-PMMA nanofibers with large surface area/volume ratio and increased both thermal stability and luminescence activity. It is thus expected that these nanofiber structure will exhibit the desired luminescent behavior as well as potential applications as highly promising phosphor materials for nanofiber-based OLEDs.

Acknowledgements: The author is grateful to the Research Funds of Mugla Sitki Kocman University (MSKÜ-BAP-17/295) for the financial support.

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