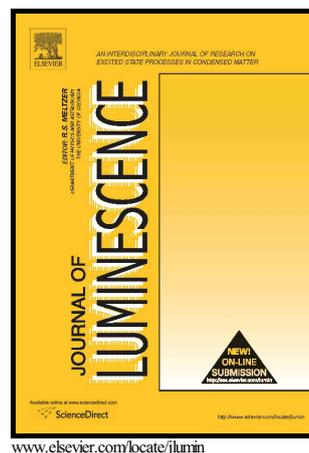


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## Study of the Energy Transfer Process in Rare Earth-Doped Silk Fibroin for Future Application in Luminescent Compounds

Roberta S. Pugina<sup>1</sup>, Euzane G. da Rocha<sup>1</sup>, Sidney J. L. Ribeiro<sup>2</sup>, José Maurício A. Caiut<sup>1,\*</sup>

<sup>1</sup>Departamento de Química, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, 14040-901 Ribeirão Preto-SP, Brazil.

<sup>2</sup>Inst. of Chemistry - São Paulo State University- UNESP, Araraquara-SP, 14801-970, Brazil.

\*caiut@ffclrp.usp.br

### Abstract

The use of rare earth (RE)-doped materials in photonics; e.g., in solid-state lasers in the UV-vis NIR spectral region, in light emitting devices, and in fibers for optical amplifiers and data storage systems, is well known. Combining the mechanical and optical properties of silk fibroin (SF) with the multifunctionality of rare earth ions could be an interesting strategy to develop new, distinguished photonic devices. For this reason and given that no studies about light emission in RE-doped silk fibroin exist, here we present an innovative approach to develop photonic devices based on SF doped with RE ions, and we employ europium ion as a structural probe in a RE-doped composite SF matrix to obtain systems with better emission parameters. To this end, we prepared self-supported films consisting of RE-doped SF. The *Bombyx mori* SF bears aromatic amino acids, such as Tyrosine (Tyr) and Tryptophan (Trp), which display fluorescent behavior. These amino acids can function as fluorescent probes of physicochemical properties. In the presence of RE ions, these amino acids can act as sensitizer in energy transfer processes. Our results revealed RE ion emission associated with an antenna effect elicited by the

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