Pioneering the Use of Selenium Catalysts in Lignin Oxidative Discoloration

C. Scimmi¹, M. Larafa¹, C. Santi¹

¹Group of Catalysis, Synthesis and Organic Green Chemistry, Department of Pharmaceutical Sciences, University of Perugia, via del Liceo 1, Perugia, 06123, Italy



Lignin (LI), a major structural polymer in plant cell walls alongside cellulose and hemicellulose, plays a crucial role in providing strength and natural defense against environmental threats. Despite its abundance and potential, especially as a byproduct of the paper industry (50–70 million tons annually), its dark brown color limits its broader use. Interestingly, lignin's aromatic nature makes it an effective natural UVblocker, making of it a sustainable alternative to harmful synthetic filters. The main challenge lies in lightening lignin without sacrificing its protective qualities. In this study, we present a novel approach based on catalytic oxidation using organoselenium compounds and hydrogen peroxide (H_2O_2) . This

protocol successfully reduces lignin's coloration while preserving its UV-blocking ability, showing promise first on model compounds and then on industrial Kraft lignin.

References:

- 1. R. Sun, ChemSusChem, 2020, 13, 4385–4393.
- 2. Y. Zhang, M. Naebe, ACS Sustain. Chem. Eng. 2021, 9, 1427–1442.