

## Bio-active Nanocomposite Films Based on Nanocrystalline Cellulose Reinforced StyrylQuinoxalin-Grafted-Chitosan: Antibacterial and Mechanical Properties

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The development of the new active polymer based on bio-based polysaccharide constitutes an active area of modern research [1] [2]. In this work, cellulose nanocrystalline (NCC) reinforced modified-chitosan films with both good mechanical and antibacterial properties were prepared by grafting two molecules of styryl-quinoxaline derivatives separately on the chitosan hydrogel in acidic media followed by solvent-casting process. The structures of synthesized molecules were confirmed by FT-IR, <sup>1</sup>H, <sup>13</sup>C-NMR spectral data and the antibacterial activity of these compounds against *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis* and *Pseudomonas Aeruginosa* was investigated. The results found a good antibacterial activity of the two compounds against *Pseudomonas Aeruginosa*. Both, unmodified and modified chitosan films are able to inhibit the growth of P.A by surface contact whose modified chitosan films were distinguished by their resistance to the antibacterial tests conditions, in contrary to the unmodified chitosan films, which are partially soluble in the same conditions. Concerning mechanical properties, the chemical modification of the chitosan was a little decrease the Young's modulus and tensile strength of the films, whereas, the addition of NCCs as nanoreinforcements leads to an important improvement of Young's modulus and tensile strength for modified-chitosan nanocomposites comparing to unmodified chitosan nanocomposites. So, this work exhibits that the combination of the chitosan modification by the new styryl-quinoxalin derivatives and the chitosan reinforcement by the nanocrystalline cellulose permits to develop new nanocomposite films that can be used as active polymers in packaging or medicinal fields.

### Biography:

Meriem Fardioui, PhD student (last year) at Ibn Tofail University, Morocco. My thesis is about the development of Nano-composites based on nanocrystalline cellulose extracted from plant fibers reinforced biopolymers for active packaging and biomedical applications. As part of my PhD, I focused on the isolation/characterization of nanocrystalline cellulose and the development of active modified-chitosane reinforced by nanocrystalline cellulose.