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Physicochemical properties of fungal chitin nanopaper from shiitake (L. edodes), enoki (F. velutipes) and oyster mushrooms (P. ostreatus)
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Abstract
We evaluate the physiochemical properties of chitin nanopaper derived from three commonly cultivated mushrooms: shiitake (Lentinula edodes), oyster (Pleurotus ostreatus), and enoki (Flammulina velutipes). Mild alkaline extraction of fungal sample yields higher chitin recovery per dry weight (23–35%) compared to crustacean source (9.7%). Our extract readily defibrillates into 15–20 nm width fiber after 5 min blending in domestic kitchen blender, implying a simple and cost-effective nanofiber preparation. Enoki nanopaper was found to be more crystalline and possess slightly higher modulus and tensile strength (Eenoki = 2.83 GPa, σenoki = 51 MPa) compared to oyster and shiitake nanopaper (Eoyster = 2.28 GPa, σoyster = 45 MPa; Eshiitake = 2.59 GPa, σshitake = 43 MPa). However, oyster nanopaper exhibit higher toughness (1.92 MJ/m3) and larger strain at break (5.63%) because of their relatively smaller fibers promote a denser fibrous network that can sustain and absorb higher external loading. © 2021 Elsevier Ltd

Author Keywords
Chitin-glucan; Mechanical properties; Mushrooms; Nanofiber; Nanopaper

Index Keywords
Blending, Cost effectiveness, Fungi, Molluscs, Nanofibers, Physicochemical properties, Tensile strength; Alkaline extraction, Chitin-glucan, Flammulina velutipes, Glucans, Lentinula edodes, Nanopaper, Oyster mushroom, Physicochemical property, Physio-chemical properties, Pleurotus ostreatus; Chitin

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