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Physicochemical characterization of a novel zinc(II)-fish collagen membrane for topical application

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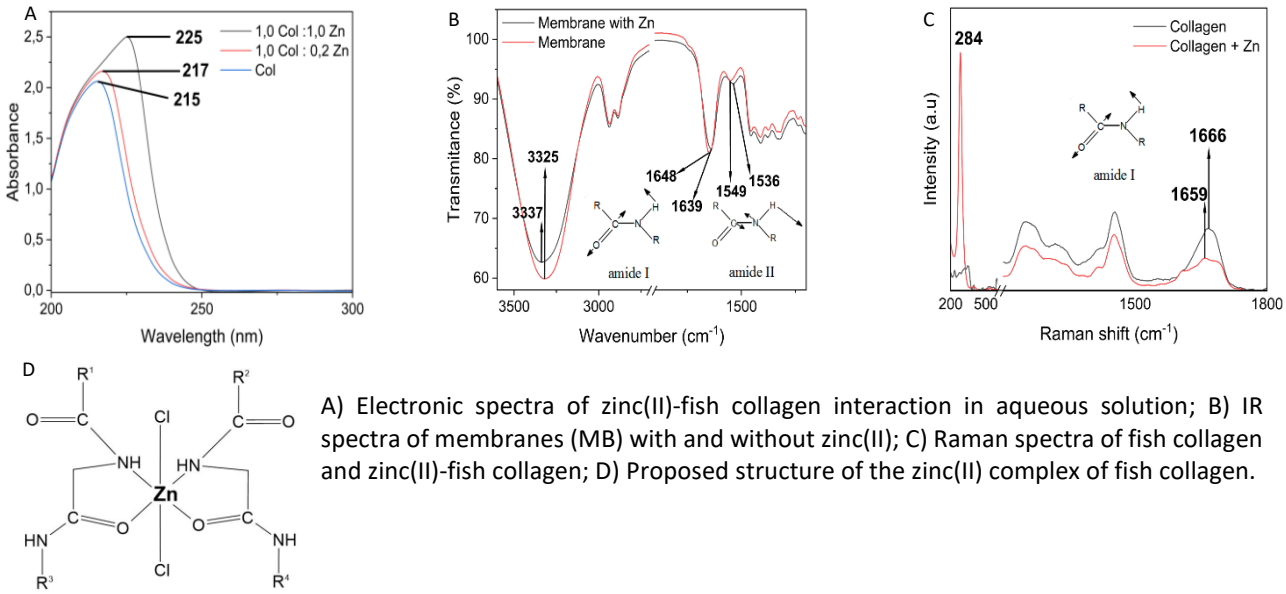
Tilapia skin collagen (TC) has healing properties, biocompatibility and low antigenicity (YAMAMOTO et al., 2015). Zinc is a metal which displays healing and antimicrobial properties (PINO et al., 2023). The present study aimed at characterizing the physicochemical properties of a novel membrane (MB) containing TC and zinc(II), also investigating its biological applications. MB was characterized by electronic, infrared (IR) and Raman spectroscopy techniques. The shift from 215 nm to 225 nm in the electronic spectra was attributed to TC-zinc(II) interaction in aqueous solution (YU et al., 2011). The IR spectra suggested metal-ligand interaction in MB, according to shifts in Amide II (N-H stretching) and Amide I (C=O stretching) absorptions, attributed to the collagen-zinc(II) complexation through the N-H and C=O of the peptide bonds (LIN et al., 2021). Furthermore, the EndMember analyses of the Raman spectra showed the homogeneity of the MB, also displaying the maintenance of a characteristic signal attributed to zinc(II)-chloride at 284cm^{-1} (KINUGAWA et al., 1989). Taken together, the spectra suggest that a novel zinc(II)-fish collagen membrane was obtained and its rheological and biological properties are under evaluation, aiming at topical application for a wide range of purposes, including wound healing and antimicrobial activity, as well as the preparation of transdermal patches for drug delivery.



A) Electronic spectra of zinc(II)-fish collagen interaction in aqueous solution; B) IR spectra of membranes (MB) with and without zinc(II); C) Raman spectra of fish collagen and zinc(II)-fish collagen; D) Proposed structure of the zinc(II) complex of fish collagen.

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