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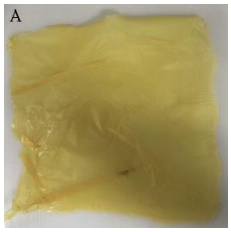
CORN ZEIN EXTRACTED FROM GROUND GRAINS OR GLUTEN MEAL IS BETTER TO PRODUCE MICROSPHERES OR COATING SILICA MICROSPHERES?

Sergio A. Yoshioka[1]*, Gabriela de Vita[1], Jéssica N. D. Ferri[1], Daniela Fachini[2]

1 – Institute of Chemistry, University of São Paulo (IQSC-USP), São Carlos, SP, Brazil – sergioy@iqsc.usp.br
2 – Interunits Postgraduate Program in Bioengineering, University of São Paulo (EESC/FMRP/IQSC-USP), São Carlos, SP, Brazil

Abstract - Zein, a hydrophobic prolamin protein extracted from corn by-products, is a promising biopolymer due to its film-forming ability, biodegradability, and potential for chemical modification. This work presents two complementary approaches to zein-based biomaterials. The first approach focuses on the preparation of pH-sensitive films (Fig 1) and nanospheres incorporating anthocyanins from black rice. Zein was extracted using hydroethanolic solutions, and both natural and anionic variants were used to form films via casting and subjected to microwave treatments to enhance mechanical resistance through ester bond formation. FTIR, Biuret assay, and contact angle measurements confirmed successful interaction between zein, glycerol, and anthocyanins. The second approach involves the immobilization of amylolytic enzymes on silica nanoparticles coated with zein. The extracted zein (Fig 2) served as a coating matrix to encapsulate silica via nanoprecipitation, followed by enzyme immobilization using glutaraldehyde. Characterization techniques included FTIR, SDS-PAGE, Biuret assay, and SEM. This strategy aims to improve enzyme stability and reuse in corn ethanol production, addressing industrial sustainability. Both studies share a methodological core—zein extraction and characterization—and converge toward valorizing agro-industrial residues through functional biopolymer development for smart packaging and catalysis.



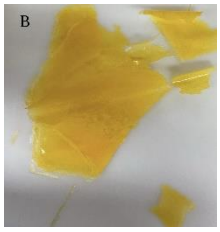


Figure 1: Zein films (A) Natural, Anionic (B).

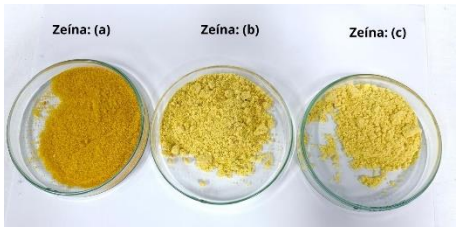


Figure 2: Zein extracted from: CGM(a); ground corn grains; (c) commercial from Aldrich

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