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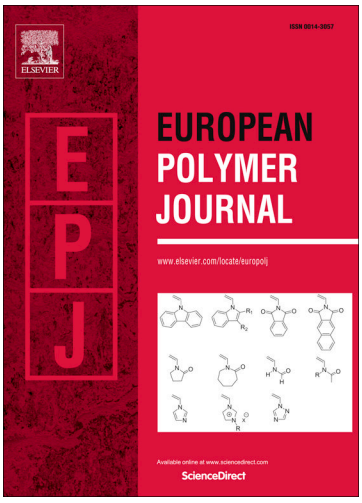

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Improved aqueous solubility and stability of Wool and Feather proteins by Reactive-Extraction with H_2O_2 as bisulfide (-S-S-) splitting agent

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ABSTRACT

With the aim of developing new bioplastics from wool and chicken feather proteins three different protein extracting methodologies were explored, aiming to split its characteristic intermolecular bisulfide (S-S) bond: one reductive, using thioglycolate ($HS-CH_2-COO^-$) as reducing agent, and two oxidative routes, one using H_2O_2 and the other NaClO as oxidative agents. The resulting corneous proteins were characterized by FTIR, SDS-PAGE, solubility tests, and by SAXS and WAXS. Treatment with NaClO destroyed completely the proteins due to strong oxidation which led to severe molecular weight reduction. In comparison with the classical thioglycolate reductive method, the oxidative H_2O_2 treatment lead to proteins with broader molecular weight distribution, lower isoelectric point, lower fractions of β-sheet structures and lower capability of bisulfide reformation, presumably due to the introduction of stable S-O species such as sulfenic (R-SOH), sulfinic ($R-SO_2H$) or sulfonic ($R-SO_3H$) acids. For these reasons this type of proteins presented higher water solubility. In addition, aqueous/isopropanol solutions of wool proteins obtained through H_2O_2 oxidation presented excellent film forming capability.

KEYWORDS: Corneous proteins, Keratins, Wool, Feather, Sustainable extraction, Bisulfide oxidation, Protein films

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