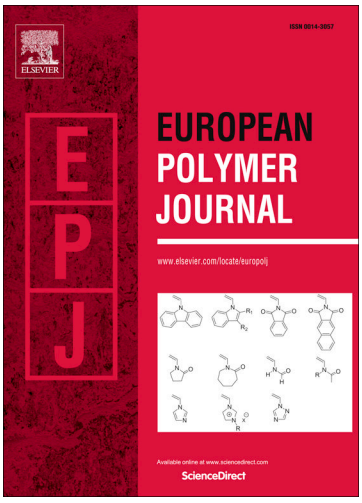

Electrospun PVA fibers loaded with antioxidant fillers extracted from *Durvillaea antarctica* algae and their effect on plasticized PLA bionanocomposites

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Electrospun PVA fibers loaded with antioxidant fillers extracted from *Durvillaea antarctica* algae and their effect on plasticized PLA bionanocomposites

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Abstract

Marine algae are important biomass source which can be used as sources for the extraction of interesting reinforcing materials with antioxidant activity. An extraction protocol was developed to determine the extraction yield (%), the total phenolic compounds and the antioxidant activity of *Durvillaea antarctica* algae extract, a Chilean brown algae. *D. antarctica* extract was added to plasticized poly(lactic acid) (PLA) matrices with triethyl citrate (TEC) to produce antioxidant bionanocomposites for active food packaging. Two different approaches were followed: the direct incorporation of *D. antarctica*, as well as its introduction encapsulated into electrospun poly(vinyl alcohol) (PVA) fibers. Flexible and optically transparent bionanocomposite films were obtained by solvent casting method. The effects of *D. antarctica* concentration and its incorporation into electrospun PVA fibers on the structural, thermal, mechanical and barrier properties of PLA based films were studied. *D. antarctica* protected plasticized PLA matrix from thermal degradation. The synergic effect of the *D. antarctica* and electrospun PVA fibers enhanced the PLA crystallinity, the oxygen barrier and mechanical performance. The antioxidant effectiveness of bionanocomposites was confirmed by release studies into a fatty food simulant, and the antimicrobial activity was also tested against *Escherichia coli*. The successful production of bionanocomposites incorporating *D. antarctica* extracted from biomass and the improved mechanical resistance, enhanced oxygen barrier as well as the antioxidant activity suggest potential applications as sustainable active food packaging.