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Development of a green epoxy adhesive for cork by adding lignin: thermal and bonding properties

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Abstract-

Lignin is obtained as a by-product in the manufacturing of cellulose pulp for paper. Usually, it is used as internal fuel in this process and, in general, it is not recovered for use as a chemical product. Lignin is the second more abundant natural polymer, and it represents an enormous renewable raw material source. It is well known that epoxy resin is extensively used thanks to its high versatility and its good thermal and mechanical properties. However, most of the commercial epoxy resins use bisphenol A as a precursor, which has been reported to have estrogenic activity. In this work, up to 50 wt% of lignosulfonic acid sodium salt (lignin) has been added to epoxy resin to reduce the amount of both hardener and resin and make a green epoxy adhesive. The effect of lignin on curing kinetics, glass transition temperature and thermal conductivity was explored. The novelty of this work is the use of this green adhesive for cork. It was found that the addition of lignin improves adhesion with cork thanks to the affinity of these materials, and a high percentage of this component produces modifications on the curing process. Besides, with the addition of lignin, the bisphenol A concentration is reduced.

Index Terms-

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