

Preparation and characterization of green adhesives using modified tannin and hyperbranched poly (amine-ester)

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Abstract

Tannin-glyoxalated Kraft lignin (TGKL) resin is a successful substitution for phenol formaldehyde resin in the production of wood adhesives, however it has a poor water resistance. To overcome this obstacle, this research was focused on scalable adhesive through the modified tannin adhesive and oligomeric pre-cursors of a hyperbranched poly (amine-ester) (HBPAE). The prepared glyoxalated Kraft lignin resin (MTGKL), TGKL, HBPAE and commercial phenol formaldehyde (CPF) resin were evaluated by FTIR, ¹H and ¹³C NMR spectroscopy. The tensile strengths and thermal stability were determined. The results indicated that the addition of HBPAE to tannin adhesive could improve the water resistance of MTGKL. This was evident when soaking plywood bonded with TGKL in cool water, where delamination occurred, but it was not evident with MTGKL. The tensile results indicated that the adhesive strengths of MTGKL, 39.72 MPa (dry) and 27.62 MPa (wet).