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Renewable UV-curable?polyester?methacrylate/cellulose nanocrystals composite?resin?for wood waterproof coating

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摘要	Low-viscosity UV-curable?resins?are widely used in industry as they allow for UV curing materials with reduced amounts of reactive diluents to adjust the viscosity. But their?mechanical properties?and waterproof performance after curing as UV coatings still need to be improved. Here, a series of low-viscosity bio-based UV-curable?polyester?methacrylates were synthesized through L-lactide (LA) and epsilon-caprolactone (CL) monomers. The results show that the introduction of star-shaped structure and random copolymerization of LA and CL can effectively reduce the viscosity of the?resin?to 313 mPa center dot s and at the same time increase the double bond conversion rate and maintain good?mechanical properties. The composite?resin?was prepared by blending the star-shaped low-viscosity?polyester?methacrylate?resin?with cellulose nanocrystals (CNCs), and the microstructure was characterized by XRD and TEM. The curing kinetics,?mechanical properties, thermal properties and waterproof properties of the composite?resin?were further tested. When the mass fraction of CNCs is 2.5 wt%, the water absorption rate of the pine samples coated with UV-cured composite?resin?is reduced to 17%, which is 65% lower than that of the uncoated samples and 20% lower than that of the samples coated with?resin?without CNC. This article provides a feasible and effective method for improving the?mechanical properties?and waterproof performance of low-viscosity UV-curing?resins.
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