EPOXY BIO-BASED MONOMERS FOR UV-CURING

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Biomass feedstocks are playing a crucial role toward the development of new sustainable materials with the aim to replace the fossil-based ones limiting the emissions and waste. Among the other, cellulose, hemicellulose and lignin are gaining interest as a source of new bio-based building blocks [1]. Indeed, lignin and cellulose represent interesting base platform to derive several monomers which can be further functionalized becoming interesting for UV-curable applications. The necessity to limit energy consumption and time lead to the innovation of production processes and the UV-technologies have gained interest to provide a valid alternative to traditional thermal curing in the production of thermosets. In this framework epoxy chemistry can fruitfully combine the use of green monomers and UV to develop new bio-derived formulations. Several green monomers have been exploited, from furan-based monomers [2] to isosorbide-based one [3]. Distinct applications have been covered spreading from coating technology to 3D printing [4]. The starting monomers were functionalized and fully characterized by NMR analysis. Then, UV-curable resins were formulated and the reactivity toward UV-light was tested by different techniques, from photo-DSC to real-time FTIR. Thermo-mechanical and mechanical properties of the green thermosets were assessed through DMTA, DSC and tensile analysis. Regarding the 3D printing applications, a comprehensive investigation of printability and final properties was carried out, while considering the coating applications, surface properties, such as adhesion, contact angle, hardness were studied.

References

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