Antimicrobial Biomaterials and Sustainable Polymers from Renewable Biomass

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Development of sustainable biomaterials and polymers from natural biomass is widely anticipated to reduce the dependence on fossil oil resources. In addition, emergence of drug resistant bacteria necessitates the development of new antimicrobial agents. Novel compounds and polymers were synthesized using pine tree resin acids that demonstrated to be effective antimicrobial agents against bacteria including Methicillin-resistant *Staphylococcus aureus* with low toxicity to mammalian cells.[1] Mechanism of action was determined using molecular dynamics simulations and dye-leakage assays. Sustainable antimicrobial and antibiofilm coatings were developed using the cationic compounds and polymers grafted on surfaces.[2] Facially amphiphilic cationic polymers were developed using bile acids for antimicrobial applications. Ring-opening metathesis polymerization was utilized to synthesize high molecular weight resin acid polymers with molecular weights as high as half a million Daltons.[3] Flexible and mechanically robust films from these resin acid polymers were developed. Furthermore, thermoplastic elastomers were prepared by combining resin acids and soybean oil derived compounds. Together, these materials show promise for antimicrobial and sustainable polymer development using hydrocarbon rich renewable biomass.

References:

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