Synthesis of Bifunctional Monomers by the Palladium-Catalyzed Carbonylation of Cardanol and its Derivatives

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Abstract

A 1,2-bis(di-*tert*-butylphosphinomethyl)benzene-modified palladium catalyst has been used to synthesize bifunctional monomers of different chain lengths from cardanol. Short-chain derivatives of cardanol, such as (*E*)-3-(dodec-8-enyl)phenol; $HOPhC_{12}$-ene, (*E*)-3-(undec-8-enyl)phenol; $HOPhC_{11}$-ene, (*E*)-3-(dec-8-enyl)phenol; $HOPhC_{10}$-ene, and 3-(non-8-enyl)phenol; $HOPhC_9$-ene, were synthesized by the metathesis of cardanol with symmetrical internal alkenes. These derivatives were methoxycarbonylated to produce monomers with different chain lengths such as methyl-16-(3-hydroxyphenyl)hexadecanoate; $HOPhC_{15}COOMe$, methyl-13-(3-hydroxyphenyl)tridecanoate; $HOPhC_{12}COOMe$, methyl-12-(3-hydroxyphenyl)dodecanoate; $HOPhC_{11}COOMe$, methyl-11-(3-hydroxyphenyl)undecanoate; $HOPhC_{10}COOMe$, and methyl-10-(3-hydroxyphenyl)decanoate; $HOPhC_9COOMe$, respectively. Polymerization of the synthesized monomers produced oligomers that consist of up to seven monomer units as confirmed by MALDI-TOF-MS. Lactone formation was also observed in some cases under polymerization conditions.