

# Synthesis of Optically Active Materials Based on Nano Structure

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Asymmetric synthesis of optically active compounds from prochiral substrate using chiral catalysts is a very attractive methodology in organic chemistry. However, removal of the expensive chiral catalyst from the crude reaction product after the completion of reaction is a tedious job. Polymer-supported catalysts are advantageous, as they can be recovered from the reaction product by simple filtration and can be reused, thus, making the process economically viable. A study of the addition of ketoester to  $\alpha$ ,  $\beta$ -unsaturated ketones in the presence of cinchona alkaloids as chiral catalyst has been reported. Polymer-supported cinchona alkaloids have been synthesized chemically. 2-Methacryloyloxyethyl isocyanate (MOI) is a bifunctional monomer with both a reactive isocyanate group and a polymerizable double bond, and is convenient and widely used for crosslinking agents. It has been reported that in trans-carbamylation reaction catalyzed by 4-N,N'-dimethylaminopyridine (DMAP), the secondary -OH group of cinchonine was carbamoylated by MOI. This article describes the syntheses and polymerizations of new chiral cinchoninyl (2-methacryloyloxyethyl) carbamate (CIMOC) from 2-methacryloyloxyethyl isocyanate (MOI) and cinchonine. Radical homopolymerizations were performed with AIBN as initiator in suitable solvent in a sealed tube at 60°C. Number average molecular weights ( $M_n$ ) of poly (CIMOC) were  $2.6 \sim 11.8 \times 10^3$ . Specific optical rotations ( $[\alpha]_{435}$ ) of poly (CIMOC) were  $+84.0^\circ \sim 0.72^\circ$  in THF. The polymers obtained were tested for their efficiency in catalyzing the Michael addition of ethyl 1-oxo-2-indan carboxylate to methylvinyl ketones. The Michael adducts using poly (CIMOC-co-styrene) showed higher enantio excess (20 % ee) compared to those obtained by using non-polymeric catalyst CIMOC (14 % ee) and poly(CIMOC) (13% ee). This method may be of importance in the synthesis of the compounds, where selectivity as well as mild reaction conditions is required by simultaneously replacing conventional catalysts with environment-friendly 'green catalysis'.