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## SYNTHESIS OF HYBRID POLYHYDROXYURETHANES BY MICHAEL ADDITION

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### ABSTRACT

The H-NIPU oligomers technology gives access to isocyanate-free polyurethanes mixing properties and reactivity of different reactants. The new hybrid H-NIPU materials were synthesized from PolyHydroxyUrethane (PHU) prepolymers terminated amines and acrylates compounds. To terminate the oligomers by amine with different chain length the cyclic carbonate (PPOBC640) was reacted with different excess of diamine (EDR-148 or CBMA). This excess of amine acts as a reactive diluent decreasing likewise the viscosity. Then, these aminotelechelic PHU oligomers were cross-linked at room temperature without solvent and catalyst thanks trimethylolpropane tris-acrylate (TMPTA) and different length of chain of poly(propylene oxide) bis-acrylate (PPOBGA). Different H-NIPU materials were obtained from a wide range oligomer of different molar masses and acrylates cross-linkers leading to new hybrid non-isocyanate polyurethane networks with various properties.

### KEYWORDS

Cyclic carbonate ; amine ; polyhydroxyurethane ; Michael addition ; acrylate

### INTRODUCTION

Polyurethanes were invented back in the 1930's by Otto Bayer and coworkers<sup>1</sup> from the works of Würtz, who discovered in 1849 the reaction between alcohol and isocyanate yielding urethane (carbamate) groups. These polymers were developed to obtain materials with properties similar than polyamide fibers (nylon) discovered earlier but protected by American patents. The development of numerous applications has been stimulated by the versatility of polyurethanes, and their ability to substitute to other materials. Around mid-50's, polyurethanes (PUs) found applications in coatings, adhesives, elastomers and rigid foams. In the next years, the development of polyol polyether at low cost allowed to obtain flexible polyurethane foams for applications in furnishing and automotive areas. Nowadays, PUs find applications everywhere in everyday life: furnishing, cars, clothing, shoes, elastomers,

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