

FURTHER ADVANCEMENTS IN LOW FREE ISOCYANATE MONOMER PREPOLYMER DESIGN FOR REACTIVE ADHESIVE SYSTEMS

Recent developments have shown that the use of low free (LF) isocyanate monomer technology is recognized as a solution for improvement of industrial hygiene as well as compliance to ECHA's pending restriction of diisocyanates in Europe. LF technology offers excellent performance, superior processing and productivity, yet these systems can be quite different from conventional systems. Such differences and further development of LF technology for adhesives are discussed herein.

The removal of diisocyanate monomer can present challenges in the final adhesive formulation such as different reactivity, the amount of prepolymer needed and overall different adhesive properties. These challenges can be overcome by exploring additional chemistries based on increased polyol functionality and optimization of molecular weight and structure. In addition, unique morphologies due to a combination approach of crystalline and amorphous polyols are explored.

Further, our developments show that a number of valuable properties can be integrated into low free isocyanate prepolymer backbone for enhanced performance. LF technology can yield prepolymers with lower viscosity at application temperature and thus, improved high crystallinity hot melt formulations with better wetting ability and fast green strength. Additionally, increased functionality can be incorporated into the backbone for controlled crosslinking and the ability to functionalize the backbone yields a new generation of more powerful and efficient prepolymers with enhanced NCO content up to 10%.

These developments lead to a broad formulation platform that enables design of prepolymers with a tailored balance between reactivity and processability in different adhesive formulations.