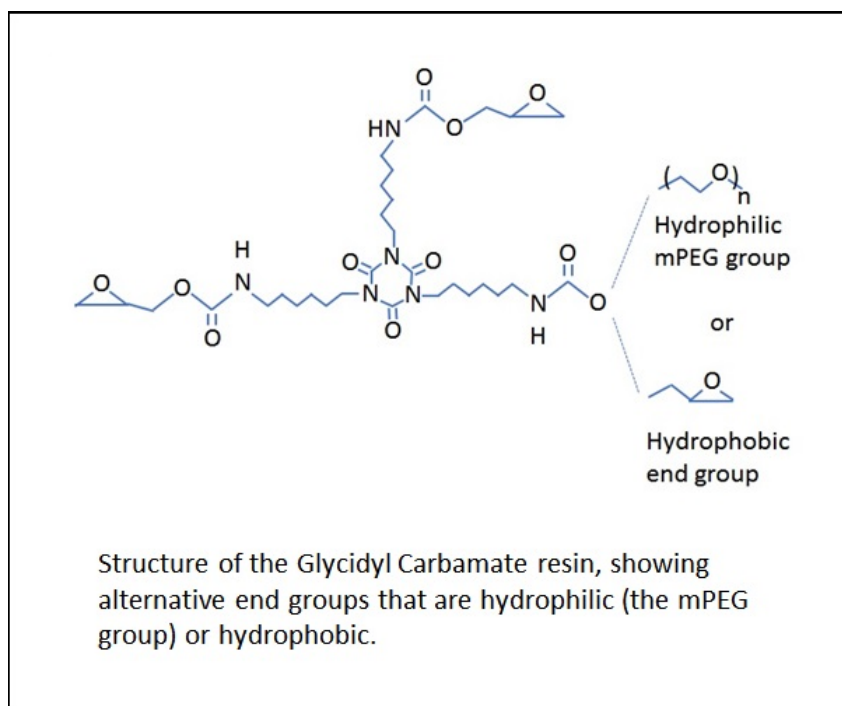


VOC-FREE WATERBORNE POLYURETHANE EPOXIDE RESIN AND CROSSLINKER FOR PRODUCING TOUGH AND FLEXIBLE COATINGS (RFT-154/154A)

Invention Summary:

Scientists at North Dakota State University have developed a polyfunctional waterborne Glycidyl Carbamate (GC) resin, comprising oligomers that provide polyurethane properties with epoxide reactivity. These compounds can be dispersed in water to form a dispersion containing no volatile organic solvent. The tough and flexible coatings produced using this material have high hardness and durability as well as high gloss. A particularly promising application is to use GC crosslinkers as a very minor ingredient in lubricious and other "fragile" coatings, where it provides substantially increased strength with minimal impact on other properties. A commercial advantage of this resin is not having isocyanate water reactions, or isocyanate toxicity concerns, but having controlled and safer reactions with amines or other reactive functionality. The technology is a waterborne, solvent-free glycidyl carbamate resin. These resins are produced by reaction of an isocyanate functional resin with glycidol, resulting in a GC product that includes urethane and epoxy functional groups. Aliphatic polyisocyanate is made water dispersible by additions of mPEG, and end capped with glycidol to produce glycidyl functionality that crosslinks. These may then be crosslinked by reaction with amines, or may self-crosslink at elevated temperature.



NDSU Research Foundation

1735 NDSU Research Park Drive Dept. 4400 PO Box 6080 Fargo, ND 58108-6050
701.231.8173 or 701.231.6659 Fax 701.231.6661 www.ndsuresearchfoundation.org

Benefits:

- May be used as a resin or crosslinker
- Very small amounts dramatically increase hardness and durability without negatively impacting lubricity
- Excellent water resistance, solvent resistance, and flexibility
- Ambient cure temperature
- No VOCs
- Transparent, with no phase change or haziness
- High gloss

Phase of Development:

This technology has successfully completed laboratory testing with reproducible results.

Patents:

This technology is the subject of US Issued Patent Nos. [7,776,956](#) and [9,676,895](#) and is available for licensing/partnering opportunities

Contact:

Saurabhi Satam

Business Development and Licensing Associate

ssatam@ndsurf.org

<http://www.ndsuresearchfoundation.org/>

701-231-8173

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