

# MONOMERS, POLYMERS AND SELF-ASSEMBLIES BASED ON AMINOCAPROLACTAM

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## ABSTRACT

Alpha-aminocaprolactam is a "green" monomer in two ways: it is a fermentation product from sugars, and its derivatives are naturally biodegradable. Synthesis of  $\alpha$ -amino- $\epsilon$ -caprolactam (ACL) derivatives through reaction with anhydrides, acid chlorides, and lactones is reported. The products were characterized by solution NMR spectroscopy, differential scanning calorimetry and thermal gravimetric analysis. These  $\alpha$ -amino- $\epsilon$ -caprolactam derivatives are (co)monomers for preparing step-growth aliphatic polyamides, polyesters and related polymers by the hydrolytic polycondensation or anionic ring opening polymerization. Various vinyl and divinyl derivatives were also synthesized. Homo- and copolymers of these monomers display surprisingly high Tg values plus a sub-Tg transition that is believed due relaxation of hydrogen bonding of pendent ACL units that allows group rotation. Finally, bis- and tetra-caprolactams are synthesized and shown to form self-assembled polymers and networks with excellent physical and thermal properties.

## References

1. Aminocaprolactam Polyesters and Polyamides, Tarkin-Tas, E.; Mathias, L.J. in preparation.
2. Vinyl Monomers and Polymers Containing Aminocaprolactam, Tas, H.; Tarkin-Tas, E.; Mathias, L.J. in preparation