

UNIVERSITY OF RHODE ISLAND
Department of Chemistry
VIRTUAL SEMINAR

2:00 P.M., Friday, April 17, 2020
Please email dugan@uri.edu for link

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***“Development of novel (thio)urea
organocatalysts for ring opening
polymerization of cyclic lactones”***

HOST

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Development of novel (thio)urea organocatalysts for ring opening polymerization of cyclic lactones

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Among multiple catalysts for ring-opening polymerization (ROP), H-bonding organocatalysts stand out for the precise level of reaction control they are able to render during ROP. The H-bonding class of organocatalysts are thought to affect ROP via dual activation of both monomer and chain end. The only drawback of this class of catalysts is the low activity shown despite their high selectivity towards ROP.

A new class of H-bond donating ureas was developed for the ROP of lactone monomers to address this problem of low activity. The most active of these new catalysts, a tris-urea H-bond donor, is among the most active organocatalysts known for ROP, yet it retains the high selectivity of H-bond mediated organocatalysts. The urea cocatalyst, along with an H-bond accepting base, exhibits characteristics of a “living” ROP, is highly active (in one case, accelerating a reaction from days to minutes), and remains active at low catalyst loadings.

With the discovery of multi H-bonding (thio)urea that is highly efficient and effective towards ROP, a novel bis-(thio)urea catalyst was developed as an enantio-selective chiral catalyst. This catalyst not only shows high stereoselectivity under mild conditions, but also shows faster rates for the polymerization of *rac*-lactic acid forming stereoblock poly-lactic acid with precise control in molecular weight, affording enhanced thermal properties.