“Putting Boron into Polymers: From Catalysis to Supramolecular Material”

The placement of heteroatoms in the main chain or side groups of polymers is receiving ever increasing attention as an approach to new functional materials with superior properties. In particular, the ability of boron to participate in $\pi$-delocalization can have a dramatic effect on the optoelectronic properties of conjugated materials by lowering the LUMO orbital levels. The electron-deficient character of boron also enables the reversible formation of Lewis pairs (LPs) by interaction of Lewis acids with Lewis bases.

As illustrated in this presentation, the judicious decoration of polymers with organoborane Lewis acid sites can be exploited in sensory and stimuli-responsive materials, as well as the development of supported catalysts that rely on the ability of Lewis acids to activate small molecules. In addition, new “smart” dynamic materials, such as reprocessable elastomers, can be generated by embedding both Lewis acid and base sites into polymer networks. Finally, the isosteric replacement of C-C units with more polarized B-N units in polystyrene offers access to analogs of commodity polymers with modified materials properties.