**The Summer Undergraduate Research Fellowship (SURF) Symposium**
**3 August 2017**
**Purdue University, West Lafayette, Indiana, USA**

# Design of Triblock Polymers for Water Filtration as Nanoporous Membranes

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## ABSTRACT

Clean, usable water is quickly becoming a less abundant natural resource for residential, commercial, and industrial applications. Developing advanced and efficient membranes as filtration components for water-treatment processes will help supply a growing society the clean water it needs. Triblock polymers have recently become of interest for their potential to create membranes that have higher selectivity while also having higher flux values than current commercially available ultrafiltration membranes. The synthesis of a triblock polymer consisting of polyisoprene (PI), polystyrene (PS), and either poly(N,N-dimethylacrylamide) (PDMA) or poly(tert-butyl acrylate) (PtBA) is reported. Each block of the polymer is synthesized via a sequential reverse addition-fragmentation chain transfer (RAFT) polymerization mechanism to achieve controlled, high molecular weights and narrow molecular weight distributions. The triblock polymer is synthesized such that the volume fractions of the PI, PS, and PDMA/PtBA blocks are about 25%, 45%, and 30%, respectively, to achieve optimal mechanical properties and pore functionality within the membrane. Subsequently, the membrane is prepared following the non-solvent induced phase separation (SNIPS) method.

## KEYWORDS

Block, Polymers, Triblock, Polyisoprene, Polystyrene, Poly(N,N-dimethylacrylamide), Poly(tert-butyl acrylate), reverse addition-fragmentation chain transfer, Membranes, Filtration