Research in the Serpe Group is focused on the development of novel polymer-based materials for solving environmental and health-related problems. To solve these problems, the group primarily employs poly (N-isopropylacrylamide) (pNIPAm)-based spherical particles as the active component in our technologies. PNIPAm-based particles (nano or microgels, depending on their diameter) are extremely porous, and are fully water soluble and swellable. Additionally, pNIPAm-based nano/microgels are responsive to temperature, shrinking in diameter as the temperature is increased to >32 °C and reswelling when they are cooled to < 32 °C. These properties have proven to be useful for the development of pNIPAm nano/microgel-based devices for sensing and biosensing applications. Additionally, this system has been tailored to yield polymer-based muscles and actuators. This talk will detail our efforts in these areas.