

**Figure S1**. Hydrolysis of microgel hydrophobic side to pH responsive poly (acid) side. The transient comonomer in the hydrophobic polymer network, pentenoic anhydride, is hydrolyzed into separated carboxylic acid groups that can respond to pH changes. Bond cleavage decreases the crosslink density in the gel network allowing it to swell with water to increase its size.



Figure S2. Temperature response of Poly (NIPAM)-PEGDA microspheres in pH 4 and pH 11 solution conditions. All scale bars are  $100 \mu m$ .