The goal of cure-on-demand polymerization is to create one-pot systems that have a long shelf life but will react rapidly when curing is desired. We use two approaches: coupling polymerizations with clock reactions and an approach called frontal polymerization in which a localized reaction zone propagates from the coupling of thermal transport and the Arrhenius dependence of the reaction rate of an exothermic polymerization. We will examine using the urea-urease reaction to create time-lapse polymerizations and isothermal frontal polymerization. We demonstrate that thermal frontal polymerization can be used to create a cure-on-demand putty for filling holes in wood, marble, and sheet rock. The putty has a months-to-years shelf life, is a one-pot formulation, can be applied leisurely and then cured rapidly with a flat heat source. We also demonstrate frontal polymerization can be used to create a cure-on-demand sculpture material. Finally, we will explore current efforts to commercialize “3P QuickCure Clay” for the art market.