

Polymerization products of lactic acid as synthetic thickening agents for textile printing

Abstract

Novel biodegradable synthetic thickener was prepared to afford high-quality printed fabrics with decreased wastewater pollution. Biodegradable poly(lactic acid-methacrylic acid) P(LA-MAA) crosslinked polymer hydrogel was formulated *in-situ* via *one-pot* reaction employing polycondensation of lactic acid and methacrylic acid followed by free radical polymerization with *N,N*-methylene diacrylamide crosslinker. The molecular structure of the crosslinked polymer was characterized by ^1H NMR and FT-IR. The rheological properties and biodegradation of the prepared composite hydrogels were investigated. The biodegradability was described by studying both of biological oxygen demand (BOD) and chemical oxygen demand (COD). Technical evaluation of P(LA-MAA) as an environmentally friendly thickener in textile printing using a variety of fabrics, including polyester, wool, acrylic, cotton, silk, cotton/polyester, wool/nylon and wool/polyester fabrics was presented. The use of composite thickener to print pigment and different classes of dyestuffs, including acid, disperse, reactive and metal complex dyestuffs was explored. Printed textile substrates, using different composites of different lactic acid ratios, displayed soft handle, and their color strength and colorfastness properties were efficiently similar to prints from commercial thickeners.