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**Development of a new shape-memory polymer in the form of microspheres**

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**Abstract:**

A novel shape-memory polymer having microspherical structure was prepared with Styrene (St), butyl acrylate (BA) and divinylbenzene (DVB) as the crosslinkers. The results clearly show the formation of crosslinked poly(St-DVB-BA) polymeric microspheres with high content of DVB. Through the variation of DVB content, different microspheres are formed, each having two-phase separation structure consisting of BA soft phase and St hard phase respectively. Both the St hard phase and chemical-crosslinker provided stable netpoints for thermally induced shape-memory effects. Thus, the Poly(St-DVB-BA) microspheres show the capability of shape deformation, shape fixation and shape recovery.

**Keywords:** Shape-memory; Polymers; Microspheres; Thermo-responsive

**1. Introduction**

Shape-memory polymers (SMPs) are defined by their unique ability to recover from large deformations of a temporary shape in response to various forms of external stimuli, including heat, electrical current, alternating magnetic fields, light exposure and immersion in water [1-3]. Recently, SMPs have attracted tremendous attention due to the growing number of potential applications such as biomedical devices, flexible optics, and electronics [2-7]. Till date, various forms of SMPs such as films, fabrics, composites, foams and even nanofibers, have been studied. To the best of our knowledge, SMPs in the form of microspheres are barely reported[8-11].

Microspheres have been recommended for many applications owing to their high specific surface area, great monodispersity and excellent load capacity [12]. These attractive fields of applications include drug delivery, cosmetics, electronic packaging, analytical chemistry, synthesis of supercapacitor electrode materials, chromatographic separation techniques, and so on [13]. In many of these applications, capability of the microspheres to change shape or other properties in response to an external stimulus, is greatly desired. Leadlein had reported the shape memory effect of

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