

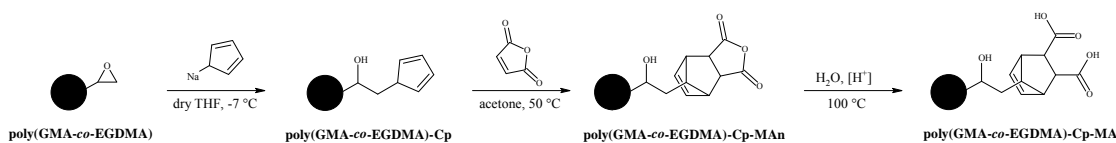
# POROUS, POLY(GMA-CO-EGDMA) MICROSPHERES: SYNTHESIS, SURFACE MODIFICATION, AND CHARACTERIZATION

Przemysław Pączkowski, and Barbara Gawdzik

Department of Polymer Chemistry, Faculty of Chemistry, Maria Curie-Skłodowska University, Gliniana 33, 20-614 Lublin, Poland

Microspheres made of cross-linked polymers can be synthesized by a range of techniques and play an important role in a variety of fields such as medicine and pharmaceutical applications, chromatography, and organic synthesis. One important parameter for the performance of microparticles in these applications is availability of functional groups on the particle's surface.

The preparation of polymeric, porous, monodisperse microspheres, is a multi-step process. In this work, primary spheres were synthesized via dispersion polymerization of styrene. Due to the monodisperse spherical shape, polystyrene (PS) seeds were an ideal material for next step, where microspheres were obtained by one-step swelling and polymerization method of glycidyl methacrylate (GMA) and ethylene glycol dimethacrylate (EGDMA). The synthesized materials were differed by amount of comonomers, PS seeds, and type of porogenic solvent (toluene, chlorobenzene, cyclohexanol, decan-1-ol, and dibutyl phthalate).



Scheme 1. The poly(GMA-co-EGDMA) microspheres' modifications steps.

This work presents, the post-polymerization method of poly(GMA-co-EGDMA) microspheres basing on combination of the ring opening reaction with Diels-Alder cycloaddition. According to Scheme 1, the transformation of oxirane ring was conducted by the sodium cyclopentadienide, which lead to the attachment of the clickable cyclopentadienyl moieties. This allows to Diels-Alder reaction with maleic anhydride as a dienophile [1].

Porous structure of polymeric microspheres were studied by nitrogen adsorption/desorption method whereas the modification steps were confirmed by spectroscopic technique (FT-IR/ATR) and thermal analysis (TGA).

[1] M. Grochowicz, P. Pączkowski, and B. Gawdzik, *Adsorpt. Sci. Technol.*, **33**, 677-684, (2015).