

Abstract

A new method of introducing permanent micropores into hyper-cross-linked polyacetylene networks has been developed. The method used a combination of polyacetylene chemistry and Schiff base chemistry. Through the coordination chain-growth polymerization of monomers with polymerizable ethynyl groups, a wide series of homopolymer and copolymer networks with rigid polyene main chains interconnected by arylene links was prepared. The networks carried substituents of the predominantly aromatic Schiff-base-type in the pendant groups. With increasing content and volume of these substituents the specific surface area of the networks decreased. The networks with a high content of Schiff-base-type substituents were non-porous. The prepared networks were subsequently hydrolyzed under the conditions optimized in this diploma thesis. The hydrolysis led to a highly efficient cleavage of the Schiff base methanimine linkages and to the removal of the cleaved low molecular weight aromatic amine and aldehyde segments from the networks. In this way, new functional groups were generated in the networks, either $\text{CH}=\text{O}$ or NH_2 . The hydrolytic modification had a fundamental effect on the texture parameters of the networks. The modification of the originally microporous networks mostly led to an increase in the specific surface area and pore volume of the networks. The modification applied to originally non-porous networks led in most of the studied cases to the introduction of extensive microporosity into these networks. In this way, it was possible to modify the originally non-porous networks into networks with a specific surface area of up to $689 \text{ m}^2/\text{g}$. The formation of micropores by the studied modification can be interpreted as the formation of void volume in the networks due to the removal of aromatic template molecules originally covalently attached to the networks. The formation of micropores in the networks as a result of the modification further indicates that after the removal of the templating molecules, there was no significant collapse of the network structure, which would lead to filling the resulting microporous volume with network monomeric units. The use of smaller template molecules with one benzene ring proved to be the most suitable for the optimal course of the modification process. Demonstration of the possibility of introducing microporosity into originally non-porous networks by means of postpolymerization modification was published as the most important finding of this diploma thesis in: B. Bashta, L. Havelková, J. Sokol, J. Brus, J. Sedláček, *Micropor. Mesopor. Mat.*, Vol. 330 (2022), 111636.