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www.elsevier.com/locate/talanta

PII: S0039-9140(18)30283-2
DOI: <https://doi.org/10.1016/j.talanta.2018.03.046>
Reference: TAL18480

To appear in: *Talanta*

Received date: 5 November 2017
Revised date: 4 March 2018
Accepted date: 14 March 2018

Cite this article as: Kai Zhang, Chaoyan Lou, Yan Zhu, Mingyu Zhi and Xiuqiong Zeng, Hyperbranched anion exchangers prepared from thiol-ene modified polymeric substrates for suppressed ion chromatography, *Talanta*, <https://doi.org/10.1016/j.talanta.2018.03.046>

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Hyperbranched anion exchangers prepared from thiol-ene modified polymeric substrates for suppressed ion chromatography

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Abstract

The covalent modification of polymeric particles has been a challenge due to their chemical inertness. Herein we describe a facile and neat method via thiol-ene reaction to immobilize cysteamine/cysteine onto allylmethacrylate-divinylbenzene (AMA-DVB) and ethylvinylbenzene-divinylbenzene (EVB-DVB). The introduced functionalities were verified by elementary analysis and scanning electron microscope coupled with energy dispersive spectroscopy. This modification enabled the further grafting of hyperbranched condensation polymers (HBCPs), which converted the particles into anion exchangers. The anion exchangers demonstrated good separation with carbonate/bicarbonate eluents and hydroxide eluents for suppressed anion exchange chromatography. In the case of a 3-layered anion exchanger, simultaneous separation of nine model anions was achieved by isocratic elution in 17 min with efficiencies up to 16100 plates m^{-1} . High stability and dependable durability was exhibited in long-term tests.

Graphical abstract

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