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Hydrogels of Versatile Size and Architecture for Effective Environmental Applications

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**Abstract:** Cationic hydrogels from a positively charged monomer, (3-Acrylamidopropyl)-trimethylammonium chloride (APTMACI), were synthesized as bulk, and micro- and nano-sizes. These hydrogels were utilized to remove contaminants such as food dyes and an environmentally toxic metal, arsenic. The micro- and nanohydrogels were dispersed in another hydrogel network to design a semi-interpenetrating network (semi-IPN) which was shown to visualize the particles that can be used for absorption purposes. The micron-sized cationic hydrogel particles were very effective in the removal of arsenic from an aqueous environment- 96% of the arsenic was removed in less than 10 min from a 55-ppm aqueous stock solution. Cationic hydrogels ca. 5 nm were also prepared and demonstrated for fluorescein dye absorption in the nanohydrogel-hydrogel semi-IPN. Hydrogel particle sizes were investigated with microscopic methods, such as optical, fluorescence, scanning electron and transmission electron microscopes.

**Key Words:** Arsenic removal, environmental hydrogels, microgels, nanogel, nanotechnology, semi-IPN networks

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