

## ABSTRACT

Polymer brushes functionalized silica gel is herein demonstrated as potential adsorbent for water remediation. For the proof of concept chromatography grade silica gel was functionalized with polycationic polymer brushes via surface initiated atom transfer radical polymerization (SI-ATRP) and polyanionic polymer brushes via surface initiated conventional radical polymerization (SI-CRP). The success of functionalization was ascertained by scanning electron microscopy (SEM), transmission electron microscopy (TEM), attenuated total reflection infrared (ATR-IR) spectroscopy, and X-ray photoelectron spectroscopy (XPS). The water remediation potential of proposed adsorbents were demonstrated for a model anionic Alizarin red S (ARS) dye, cationic Rhodamine 6G dye, Cr in the form of  $\text{Cr}_2\text{O}_7^{2-}$  anions,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Cd}^{2+}$ , and  $\text{Pb}^{2+}$ . The polyMETAC-Silica adsorbent system exhibited high remediation capacity for ARS dye, i.e. >95%, and Cr, i.e. >98% and polyMPS adsorbent system exhibited high remediation capacity for Rhodamine 6G dye, i.e. >97%, and  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Cd}^{2+}$ , i.e. >97%, and for  $\text{Pb}^{2+}$  100%.