Supplemental Material

Investigation on Ammonium Ions Removal from Aqueous solutions using Arene- and Propyl-sulfonic Acid Functionalized Mesoporous Silica Adsorbents
Romuald Brice Babou Kammoe and Safia Hamoudi

BET analysis and textural properties

All the samples were vacuum degassed at 200 °C during 6 hours before nitrogen adsorption analysis. Total pore volume was estimated from the amount adsorbed at 0.99 relative pressures. Pore size distributions were calculated using the desorption branch of the N₂ adsorption/desorption isotherms and the Barrett–Joyner–Halenda (BJH) method.
Figure S1. (A) Nitrogen adsorption-desorption isotherms and (B) pore size distribution of pure and sulfonic acid functionalized SBA-15 materials.
**Discussion:**

Total pore volume denoted a decrease from 1.3 cm$^3$/g for the pure silica material to lower values for the functionalized materials depending on the functional groups and the functionalization strategy. The lowest values (0.29 and 0.34 cm$^3$/g) were exhibited by the arene sulfonic acid functionalized materials. The propyl-sulfonic acid functionalized materials exhibited pore volumes of 0.45 and 0.89 cm$^3$/g with the lowest value registered for the co-condensed material. Therefore, it appears clearly that both functional group nature and functionalization strategy influenced the textural properties of the different materials. The bulkiest arene sulfonic acid groups and co-condensation strategy were more challenging for the materials textural properties. Pore size distributions denoted a decrease from 6.8 nm for the pure SBA-15 to ca. 5.5 nm for both grafted materials. However, the materials synthesized via co-condensation registered a more pronounced decrease in their pore size distributions centered on 3.8 nm. This can be attributed to the pore filling with the different protruding functional groups within the pore framework of the materials functionalized using co-condensation while functionalization probably occurred on the external surface in the case of grafted materials, thus having less impact on the internal pore framework.