Disulfide polymer grafted porous carbon composites for heavy metal removal from stormwater runoff - DTU Orbit (10/11/2019)

The emerging concern of heavy metal pollution derived from stormwater runoff has triggered a demand for effective heavy metal sorbents. To be an effective sorbent, high affinity along with rapid sorption kinetics for environmental relevant concentrations of heavy metals is important. Herein, we have introduced a new composite suitable for trace metal concentration removal, which consists of cheap and common granular activated carbon covered with polymers containing soft bases, thiols, through acyl chlorination (DiS-AC). Material characterization demonstrated that the polymer was successfully grafted and grown onto the surface of the carbon substrate. The distribution coefficient for Cd²⁺ bonding was 89·10³ L/kg at a solution concentration of 0.35 mg/L, which is notably higher than sorption affinities for Cd²⁺ seen in conventional sorbents. The sorption isotherm is well described by the Freundlich isotherm and within an hour, half of the initial trace (0.2 mg/L) concentration of Cd²⁺ was removed by the DiS-AC at a sorbent loading of 2 g/L. Therefore, the novel material DiS-AC promises to be an ideal candidate for filters treating stormwater runoff.