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Plasma-grafted polyamine/hydrotalcite as high efficient adsorbents for retention of uranium (VI) from aqueous solutions

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Abstract: The high efficient adsorbent of polyamine/hydrotalcite (PANI/HT) composites has been fabricated by plasma-grafting techniques. In this study, the effect of environmental factors on the adsorption of U(VI) on PANI/HT was investigated by EXAFS, modeling and theoretical calculations. The characteristic results indicated that the large layer spacing of PANI/HT provided the massive interlayer ion exchange capacity for U(VI). The batch results illustrated that no effect of ionic strength on U(VI) adsorption at pH > 5.0 was observed, moreover the U-N and U-Si shells were observed at pH 5.0 and 7.0 by the EXAFS analysis, respectively, indicating that inner-sphere surface complexation dominated U(VI) adsorption at pH > 5.0. The desorption results showed that release of U(VI) from PANI/HT was irreversible, which indicated that the PANI/HT presented the large layer spacing to fix uranyl into cage space of the adjacent octahedral. The adsorption behaviors of U(VI) on PANI/HT can be well fitted by double layer modeling with ion exchange and inner-sphere surface complexation.

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