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Abstract The interaction mechanism of high effective enrichment of U(VI) on sulfonated graphene oxide (GO) at ultralow pH still remains unclear. The batch characteristic results showed that sulfonated GO presented a variety of functional groups such as hydroxyl (-OH), carboxyl (-COOH) and sulfonyl (-OSO_3H) groups. The macroscopic results indicated that the sorption of U(VI) on sulfonated GO was independent of ionic strength, and the maximum sorption capacity calculated from Langmuir model was 45.05 mg/g at pH 2.0. The change of relative intensities for S 2p