

First Cationic Uranyl-Organic Framework with Anion Exchange Capabilities

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By controlling the extent of hydrolysis during the self-assemble process of zwitterionic-based ligand with uranyl cations, we observed a structural evolution from a neutral uranyl organic framework $[(\text{UO}_2)_2(\text{TTTPC})(\text{OH})\text{O}(\text{COOH})] \cdot 1.5\text{DMF} \cdot 7\text{H}_2\text{O}$ (SCU-6) to the first cationic uranyl organic framework with the formula of $[(\text{UO}_2)(\text{HTTTPC})(\text{OH})]\text{Br} \cdot 2.5\text{DMF} \cdot 4\text{H}_2\text{O}$ (SCU-7). The crystal structures of SCU-6 and SCU-7 are layers built with tetranuclear and dinuclear uranyl cluster respectively. Exchangeable halide anions are present in the interlaminar spaces balancing the positive charge of layers in SCU-7. Therefore, SCU-7 is able to effectively remove perchlorate anions from aqueous solution. Meanwhile, the H_2PO_4^- exchanged SCU-7 materials exhibits a moderate proton conductivity of $8.70 \times 10^{-5} \text{ S cm}^{-1}$ at 50 °C and 90 % relative humidity, representing nearly 80 times enhancement compared to the original material.

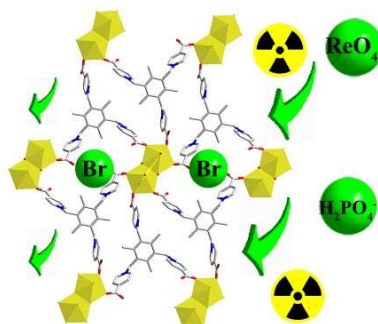


Fig.1. Simulation process TcO_4^- exchange using SCU-7

REFERENCES

- [1] Zhuanling Bai, Z.; Wang, Y.; Li, Y.; Liu, W.; Chen, L.; Sheng, D.; Diwu, J.; Chai, Z.; Albrecht-Schmitt, T. E.; Wang, S. *Inorg. Chem.* **2016**, *55*, 6358–6360.