

GAO Can, HU Yaoqiang, ZHANG Huifang, YE Xiushen, LI Quan, LIU Haining and WU Zhijian, 2014. Preparation of Silver Nanoparticles Film and the Adsorption of Iodide. *Acta Geologica Sinica* (English Edition), 88(supp. 1): 313-314.

Preparation of Silver Nanoparticles Film and the Adsorption of Iodide

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Iodine and iodine compounds are widely applied in medicaments, dyes, energy materials, food additives etc. The development and utilization of iodine resources have attracted much attention. A large amount of iodide is contained in salt lakes of Qaidam Basin and it is of great importance to extract or remove iodide from the salt lakes. Adsorption is a useful and efficient approach to remove or extract iodide from aqueous solution at low concentration.

In this work, a new, stable and effective adsorbent of silver nanoparticles (Ag NPs) loaded on 3-aminopropyltriethoxysilane (APTES) modified glass slides for iodide from aqueous solution was prepared. The influences of initial iodide concentration and co-existing chloride and bromide were investigated. The scanning electron microscopic imaging (SEM) images indicated that the Ag NPs films on the glasses are uniform (Fig. 1). Adsorption results showed that the adsorption amount increased with the initial iodide concentration and the equilibrium was reached in 200 hours (Fig. 2). The energy dispersive spectroscopy (EDS) spectra showed that only iodide was existed on this adsorbing material after adsorption in both iodide solution and iodide, chloride and bromide solution, indicating that the co-existing chloride and bromide were not adsorbed by the adsorbent (Fig. 3).

Keywords: iodide, adsorption, silver nanoparticles.

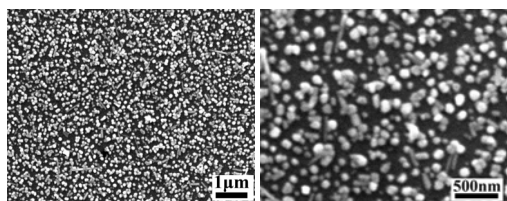


Fig. 1. SEM images of the Ag NPs loaded on the APTES modified glass slide

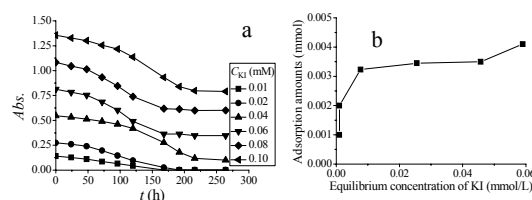


Fig. 2. The adsorption kinetics (a) and thermodynamic (b) curves of KI on the adsorbent

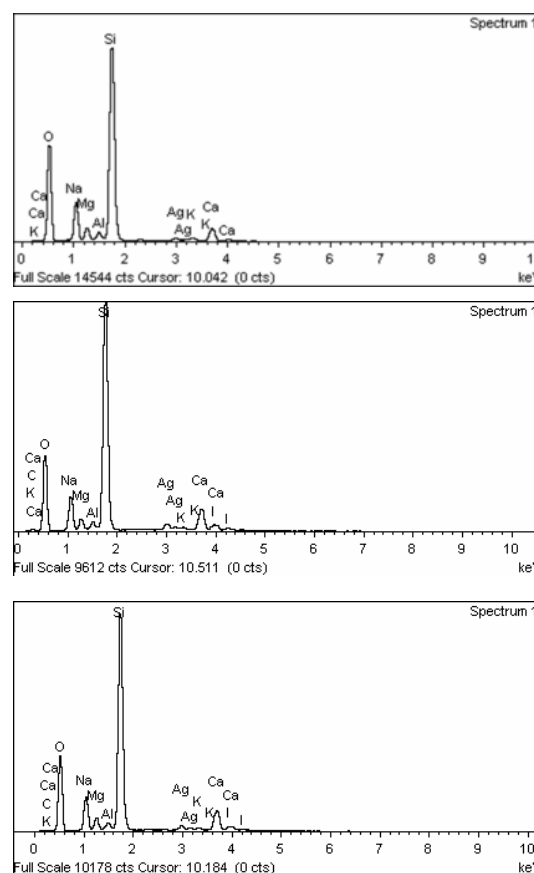


Fig. 3. EDS patterns of Ag NPs film before and after adsorption

a: Before adsorption; b: After adsorbing 0.06 mmol/L KI and 0.01 mol/L KCl mixed solution; c: After adsorbing 0.03 mmol/L KI and 0.03 mmol/L KBr mixed solution.

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Acknowledgements

This work was financially supported by the foundation of Knowledge Innovation Program of Chinese Academy of Sciences (KZCX2-EW-QN309), National Natural Science Foundation of China (51002164) and the Foundation of Basic Research for Application of Qinghai Province (2013-Z-706).

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