Takashi Ogi

Associate Professor

Department of Chemical Engineering,

Faculty of Engineering, Hiroshima University,

Ogit@hiroshima-u.ac.jp

https://takashiogi.amebaownd.com/

Research keywords: Particle and process engineering, Nanostructured particles, Nanoparticle, Resource recovery, Spray process, Aerosol process, Porous structure, Hollow structure, Core-shell structure.

Our group focuses on i) synthesis and functionalization of nanoparticle [1,2], ii) synthesis of nanostructured particles for energy, environmental, food, and medical applications [3], and (iii) resource recovery and recycling [4,5], for building a sustainable society. Regarding (iii), we developed a facile method for tungsten ion removal using lysine for the development of an environmentally friendly and sustainable recycling technique (Fig. 1). Lysine addition to the tungsten solution achieved 100% tungsten removal within 5 min, as a white lysine‐tungsten precipitate. Electrospray ionization mass spectrometry analyses of the tungsten and lysine mixed solutions showed that lysine promoted dehydration condensation reactions of anionic tungsten species such as HWO^{4-} and $W_6O_{19}^{2-}$ through the electrostatic interactions between positively charged lysine and negatively charged tungsten ions. Calcination of the lysine–tungsten precipitate produced tungsten oxide powder of high purity (99.6%) because the lysine is completely decomposed. This facile and useful metal removal method can be used for polyoxometalates of other metals such as molybdenum, tantalum, and niobium.

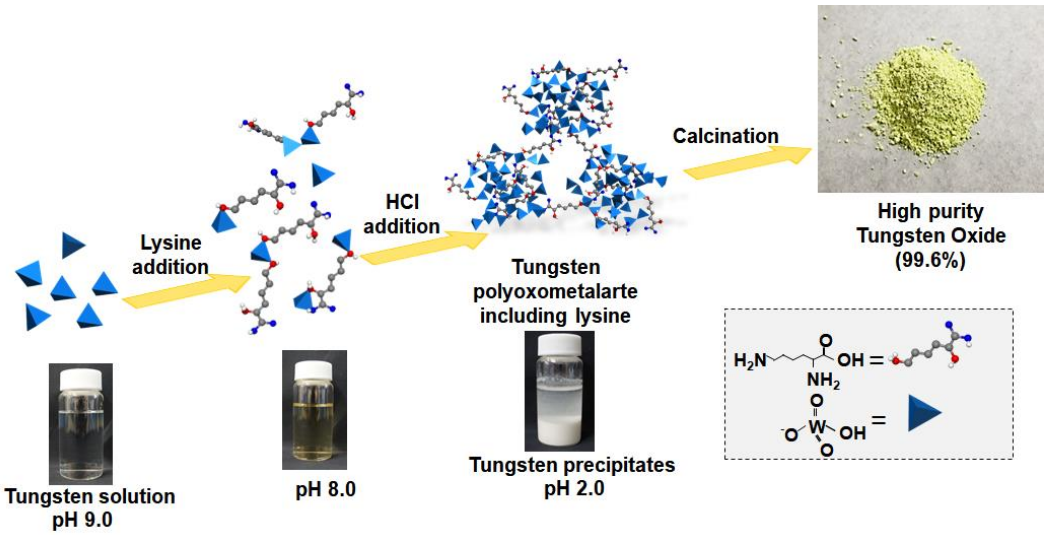

Fig. 1Facile and efficient removal of tungsten anions using lysine-promoted precipitation

for recycling high-purity tungsten

References

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