

Use of siderophores for the selective extraction of Indium from spent LCD

Eric D. van Hullebusch^{1}, Kun Zheng¹, Marc Benedetti¹*

¹Université Paris Cité, Institut de Physique du Globe de Paris, CNRS, F-75005, Paris, France

**vanHullebusch@ipgp.fr*

Generally microbial complexing agents such as siderophores are attractive molecules enabling a selective binding of different metal ions. Siderophores are organic ligands produced by the microorganisms that are well known to be highly specific and sensitive towards Fe^{3+} [1]. This high specificity and selectivity has been reported towards Ga and Ge due to their similar ionic radius and their ability to form hexadentate complex [2]. The selectivity is also extended to In to a large extent as based on experiments carried out by Jain et al. [2]. Indeed, desferrioxamine B (DFOB) and desferrrioxamine E (DFOE), two hydroxamate siderophores have been demonstrated to bind selectively and sensitively with Ga, Ge and In [2]. In parallel, the increasing consumption of electrical and electronic equipment has made recycling from end-of-life (EoL) products a key strategy for the stable supply of technology-critical elements and the development of a circular economy as proposed by the European Union (EU) [3]. The sustainable supply of indium, which is listed as a critical raw material by EU commission, is a major concern due to its high economic value. As one of the major electronic waste (e-waste), liquid crystal display (LCD) panels are a potential resource for indium because the indium-tin oxide layer in the LCD panels contains 80-90 wt% In_2O_3 . Among the different methods aiming to recover indium from EoL LCD panels, we developed a bio-based innovative and alternative technology to selectively leach indium from EoL LCD panels using desferrioxamine E (DFOE). DFOE exhibits a strong ability to bind indium while In-DFOE complex formation from bio-based leaching method will allow selective indium recovery thanks to the “GaIlophore” technology [4]. The optimal conditions and the best leaching yields were determined by analyzing the influence of various parameters, including pH, pulp density, particle size, and the concentration of DFOE. The latest results regarding this project will be presented during the conference.

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References

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