



Defence announcement

Public Defence on 22 March 2024

Title of the doctoral thesis	Recovering Cobalt from Aqueous Solutions by Evaporative, Reactive, and Cooling Crystallization
Content of the doctoral thesis	Cobalt, which has been recognized as a critical raw material, plays a vital role in the energy transition that helps to achieve greenhouse gas neutrality. The demand for cobalt continuously increases and the supply of primary cobalt is surrounding risks. Recovering cobalt from aqueous solutions, such as waste waters, industrial process waters, and side-streams is timely a crucial topic. In this dissertation, a deep understanding on vacuum evaporative crystallization, batch and continuous cooling crystallization for cobalt sulfate, and the precipitation for cobalt carbonate were generated via both theoretical and experimental investigation. Those crystallization methods show great potential for the recovery of cobalt from the aqueous solutions. Moreover, Raman and UV/Vis Spectroscopy are efficient, robust, and easy to use for determining the ion's concentrations which is valuable for the monitoring of crystallization.
Field of the doctoral thesis	Chemical Engineering in Aqueous Systems
Doctoral candidate and contact information	M.Sc. (Tech.) Jianxin Zhang Jianxin.zhang@aalto.fi
Public defence date and time	22 nd of March 2024 at 10 o'clock (in Finnish time)
Remote defence	https://aalto.zoom.us/j/62809353054
Place of public defence	Aalto University School of Chemical Engineering, Lecture hall Ke2 (Komppa-Sali), Kemistintie 1, (main door at Biologinkuja) Espoo
Opponent(s)	Professor Zoltan Nagy, Purdue University, USA/Loughborough University, UK
Custos	Professor Marjatta Louhi-Kultanen, Aalto University School of Chemical Engineering, Department of Chemical and Metallurgical Engineering
Link to electronic thesis	https://aaltodoc.aalto.fi/handle/123456789/51

Keywords: Cobalt; Crystallization; Nucleation and growth kinetics; Raman and UV/Vis Spectroscopy