

Influence of the magnetic field on the properties of Ni, Cu, and Fe as the components of High-Entropy Alloys

Katarzyna Skibińska ^{1*}, Dawid Kutyla ¹, Piotr Żabiński ¹

¹ *Faculty of Non-Ferrous Metals, AGH University of Krakow, Kraków, Poland;*

**corresponding author: kskib@agh.edu.pl*

High-Entropy Alloys (HEAs) are defined as solid-solution alloys that contain more than five principal elements in equal or nearly equal atomic percentages (at.%) [1]. Its final composition should also be tailored as a function of intended final uses. For example, if the material needs to be resistant to high temperatures, it is advisable to use refractory elements such as Hf, W, V, Zr, Ta, Nb, Ti [2]; or if magnetic properties are crucial, Fe, Ni, and Co can be present [3]. The composition, morphology, and, therefore, catalytic properties of electrodeposited Ni-Cu [4] and Cu-Fe [5] alloys depend on the applied magnetic field.

In this work, the influence of the applied magnetic field on the properties of Ni, Cu, and Fe was analyzed using various techniques, including Scanning Electron Microscopy, Atomic Force Microscopy, X-ray diffraction analysis, contact angle measurements, and Double-Layer Capacitance measurements. The catalytic activity was tested in 1M NaOH. These results are valuable information for the future design of HEAs for catalytic applications.

Research project supported by the program „Excellence initiative – research university” for the AGH University of Krakow, Grant No. 9705.

- [1] Y. Zhang et al., Progress in Materials Science 61 (2014) 1-93.
- [2] M. Ciurans-Oset, J. Mouzon and F. Akhtar, Advanced Materials Technologies 2401643 (2025).
- [3] K.X. Zhou et al., Intermetallics 122 (2020) 106801.
- [4] K. Skibińska et al., Metals 14 (2024) 281.
- [5] K. Skibińska et al., Transactions of the IMF 102 (2024) 290-296.