Contribution ID: **287** Contribution code: **TUE-PO1-504-03** Type: **Poster**

Development of novel magnetic separation for paramagnetic particles using the selection tube

Tuesday 16 November 2021 13:15 (20 minutes)

We proposed the novel separation method, which is the combination of magnetic separation and selection tube, aiming at more precise and easier separation for the paramagnetic substances than the conventional High Gradient Magnetic Separation (HGMS). In order to control and separate the paramagnetic substances with magnetic force, the magnetic field of higher than 5T and high gradient magnetic field are inevitable. This means high gradient superconducting magnetic separation system is needed. In this study, we aim to apply a lower magnetic field for magnetic separation of paramagnetic substances.
Selection tube can separate particle mixture in a suspension into each component of particles by the balancing the drag force, buoyancy and gravity. The drag force and buoyancy depends on flow velocity, particle size, shape and specific weight. By controlling the flow velocity we can separate particles precisely depending the size. Since the particles are apparent weightless state in balanced condition, even the paramagnetic particles can be captured with a relatively small magnetic force.
Firstly, we showed the effectiveness of the developed system using the imitated substance, colored glass. The 1.3T Open Gradient Magnetic Separation and the selection tube were employed. The experimental results were found to shows good separation efficiency. Eventually, we tested the system using HGMS instead of OGMS whether the separation efficiency could be improved at lower magnetic field. The SUS 430 magnetic filters which was 0.8mm in diameter and 15mesh were installed in the selection tube and the magnetic field of 0.5T was applied. The effective separation of paramagnetic glass (volume magnetic susceptibility: +3.17×10-4) was performed successfully by the developed system.

Primary authors: Prof. MISHIMA, Fumihito (Fukui University of Technology); Prof. NOMURA, NAOKI (FUKUI UNIVERSITY OF TECHNOLOGY)

Co-author: Prof. NISHIJIMA, SHIGEHIRO (FUKUI UNIVERSITY OF TECHNOLOGY)

Presenter: Prof. MISHIMA, Fumihito (Fukui University of Technology)

Session Classification: TUE-PO1-504 Special purpose magnets I: Field gradients & other applications