This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 623518

Marie Curie Action: International Outgoing Fellowship

CAPTURE

Project title:	**Capture of mineral particles by rising bubbles**
Project coordinator:	**Helmholtz-Zentrum Dresden-Rossendorf e.V. Germany**
Partner institution:	**Kyoto University, Japan**
Starting date:	**27.10.2014**
Duration (months):	**36**

Summary

Froth flotation is a dominant process in mineral exploitation processes. It is employed to concentrate valuable commodities such as copper, zinc, nickel and rare earth minerals. The process essentially involves the capturing of valuable hydrophobic particles by dispersed air bubbles while leaving the valueless hydrophilic material in the flotation cell.

The last few years have seen a surge in rare earth exploration activities around the world. Rare earth metals are extensively employed for the manufacturing of hi-tech and low-carbon energy technologies.

They are found in mobile phones, solar panels and wind turbines. Flotation is an area of future growth in Europe. A consistent supply is of strategic and economic importance to maintain European competitiveness.

Despite considerable theoretical and experimental effort for over a century, the capture of hydrophobic particles by bubbles is not understood. Theoretical models are very restricted in their applications since complexity increases rapidly, especially for cases in which many particles coat the bubble surface.

For the first time, the Smoothed Profile Method recently developed by the University of Kyoto (Japan) will be employed to simulate particle agglomeration on the bubble surface. In an "idealised" flotation cell, mineral particles and single air bubbles will numerically interact as fully resolved entities. A patented X-ray tomography system developed by the return host will be deployed for the measurement of rising particle-bubble aggregates in a water column. Particle attachment on the bubble surface will be measured using Positron Emission Tomography.

The project will bring together Asian's and Europe's leading multiphase flow laboratories. The results of this "idealized system" will be an essential prerequisite for future model extension to large-scale industrial flotation units. The outcomes of CAPTURE will ultimately assist Europe in making the transition to a more resource-efficient mining industry.