TECHNISCHE UNIVERSITÄT DRESDEN

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Investigation of Solvent Extraction of Rare Earths using Interferometry (Student Assistant 15 h/Week for 3 Months + Extension)

Rare earths are a group of 17 elements in the periodic table. They have unique physical and chemical properties that make them indispensable for many high-tech components such as electromobility, lasers, catalysts, etc. The separation of rare earths in industry is mainly done by liquid-liquid extraction, a technique with a high environmental footprint. The separation is based on the small difference in the affinity of the rare earths to the extraction agent used. Therefore, the separation factor, a parameter that quantifies the "separability" of these elements, is low. Normally, hundreds of repetitive steps have to be carried out in plants that produce several individual rare earth products.

In order to develop an alternative, more environmentally friendly method of extracting rare earths, a sound knowledge of extraction kinetics is required. As there are still large gaps in our knowledge of the processes that take place during extraction, research into kinetics is the basis for the development of new methods.

There are numerous techniques for determining the reaction parameters during the liquid-liquid solution extraction of rare earths (Single Drop, Lewis Cell, AKUFVE, Mixer-Settler). They all have their own disadvantages. The concentration inside a glass cell can be measured non-invasively during the extraction process using interferometers. This allows conclusions to be drawn about the reaction kinetics and a deeper understanding of the physico-chemical processes to be gained. Promising candidates will then have the opportunity (dissertation/diploma thesis) to continue their work (if interested).

Major Tasks:

1. Preparation of chemical solutions for the interferometer experiment
2. Preliminary measurements (Refractometer, UV-Vis Spectrometer)
3. Preparation and cleaning of the measuring cells (Hele – Shaw cells)
4. Preparation and joint execution of laser
5. Data backup and post-processing

DRESDEN concept

Requirements:

1. Interest in applied optical experiments
2. Basic knowledge of chemical and fluid technology
3. Handling common laboratory chemicals
4. Ability to work conscientiously and safely
5. Communication skills and some basic data analysis skills

Contact:

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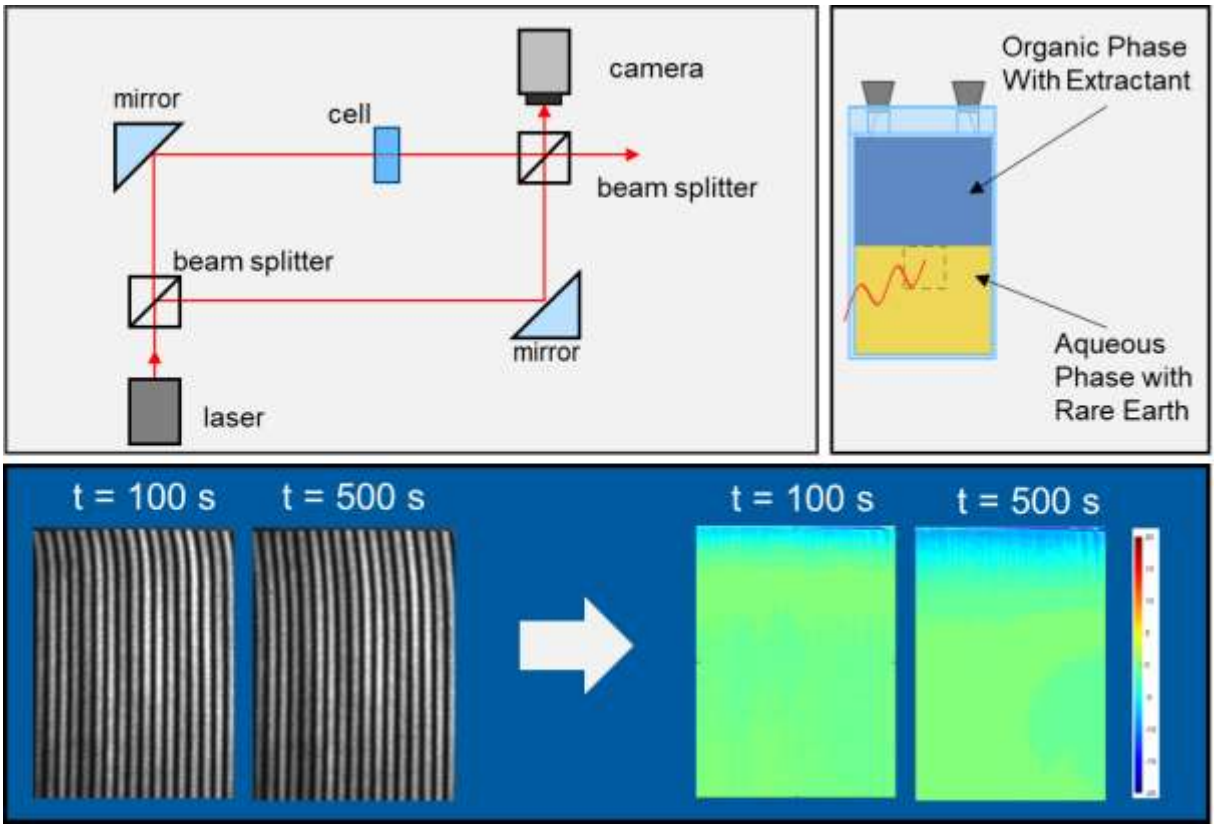

***Figure 1**: Top Left: Interferometer Scheme; Top Right: Hele - Shaw Measuring Cell; Bottom Left: Interferogram; Bottom Right: Concentration Field*