

The Institute of Advanced Optical Technologies – Thermophysical Properties (AOT-TP) offers

Master and Bachelor thesis

with the tentative title

Effective thermal conductivity of microemulsions consisting of water micelles in n-decane

Microemulsions are composed of a liquid dispersion medium and a dispersed phase of colloidal liquid micelles in the nanometer scale. To form microemulsions, two immiscible liquids are required, often a hydrophilic compound such as water, and a hydrophobic compound such as an oil. To obtain **thermodynamically stable** microemulsions and to allow for **variations in the morphology** of the dispersed micellar phase by changes in, e.g., composition and/or temperature, amphiphilic components, i.e. surfactants are also required.

Microemulsions have potential applications in many fields, including chemical, energy, and medical engineering. However, accurate knowledge of their **effective thermal conductivity** is often lacking. To address this issue, we have developed at AOT-TP a state-of-the-art instrument called the Guarded Parallel Plate Instrument (GP²I) for measuring the effective thermal conductivity.

This work has three major goals:

1. To characterize microemulsions by studying how changes in composition and/or temperature affect their morphology
2. To measure the effective thermal conductivity of microemulsions using the GP²I
3. To gain a deeper understanding of how the changes in composition and/or temperature impact the effective thermal conductivity of the microemulsions.

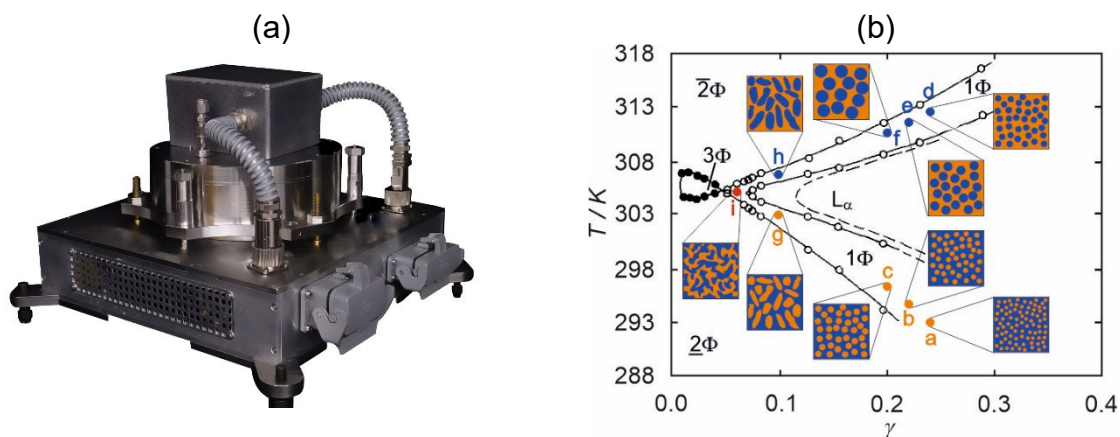


Figure 1: (a) guarded parallel plate instrument (GP²I), (b) phase diagram in form of the T, γ -section for the microemulsion system proposed in this work.

We are looking for a dedicated student who has a strong interest in thermophysical fluid properties. Our team is diverse, international, and collaborative, providing an ideal setting for scientific discovery and personal development.

Start: June 2023

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