Friedrich-Alexander-Universität
Technische Fakultät

AOT-TP

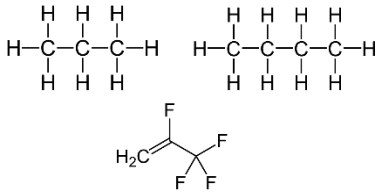
The **Institute of Advanced Optical Technologies – Thermophysical Properties (AOT-TP)** offers a

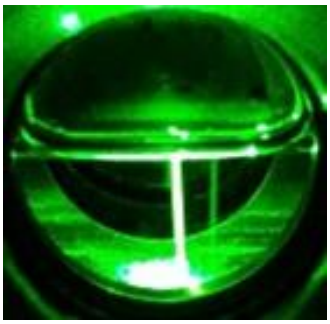
Master Thesis

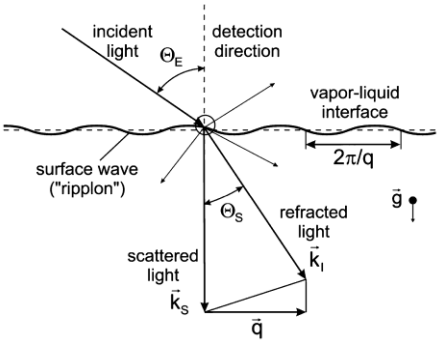
with the tentative title

Viscosity and Interfacial Tension of Alternative Refrigerants and Their Mixtures by Surface Light Scattering

Due to their high global warming potential (GWP), hydrofluorocarbons need to be replaced as working fluids in refrigeration and climate control systems. In the current research for suitable alternatives, hydrocarbons or hydrofluoroolefins appear to be promising because of their relatively low GWP and favorable thermophysical properties. To replicate the properties of conventional hydrofluorocarbons, mixtures of such alternative refrigerants offer the possibility for tailoring their thermophysical properties. Until today, only a very limited data situation for the thermophysical properties including viscosity and interfacial tension of mixtures of alternative refrigerants at process-relevant conditions is available.







The work advertised here aims at the simultaneous determination of liquid viscosity and interfacial tension of propane, *n*-butane, and 2,3,3,3-tetrafluoropropene (HFO-1234yf) as well as their binary mixtures at vapor-liquid equilibrium using surface light scattering (SLS). The method probes the dynamics of surface fluctuations at the phase boundary of fluids, which is reflected by the temporal behavior of the scattered light intensity. At AOT-TP, the method is well-established for the determination of viscosity and surface or interfacial tension of fluids with expanded uncertainties of 2% and below at macroscopic thermodynamic equilibrium. Starting with the investigation of pure fluids, related binary mixtures should be studied over a broad composition range at temperatures between about (283 and 393) K. In addition to performing the SLS experiments, the work also includes the evaluation of the measurement signals for the determination of viscosity and interfacial tension as well as the preparation of the results for their use in scientific publications.

For the outlined thesis, we are looking for a committed student with interests in optical metrology and thermophysical properties. We offer a diverse, multidisciplinary, and international working environment with excellent potential for scientific and personal development.

Start of the thesis: as soon as possible

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