Friedrich-Alexander-Universität
Technische Fakultät

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

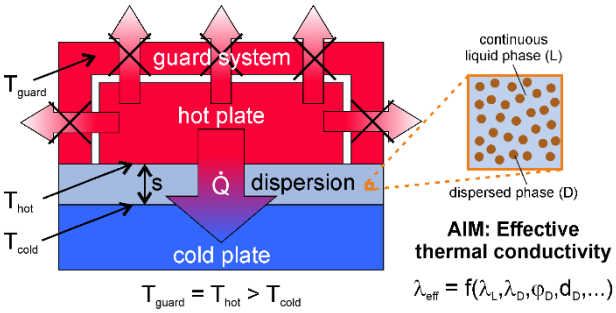
Position als Research Assistant (m/w/d) with the perspective of a doctorate

associated with the research topic

Effective thermal conductivity of dispersions with a continuous liquid phase

Dispersions with a continuous liquid phase are heterogeneous systems consisting of a liquid dispersion medium and a dispersed phase of colloidal particles. A key thermophysical property for the description of heat transfer in dispersions is their effective thermal conductivity (ETC). Many studies in literature report that by adding a small amount of solid nanoparticles to liquids, the ETC of the "nanofluids" formed can be increased extraordinarily compared to the base fluid, while others observe no significant increase. In this context, a variety of mechanisms and influencing factors is considered, which is also reflected in different prediction approaches developed so far. The ongoing debate about the ETC of dispersions is also connected to the reliability of the experimental methods used.

In a research project funded by the German Research Foundation (DFG), it is the aim to improve the fundamental understanding of the ETC of dispersions with a continuous liquid phase by systematically investigating relevant influencing factors. Here, the focus is on the thermal conductivities of the dispersed and continuous phases as well as the morphology of the dispersed particles and their stability. In addition, influences of a possible thermal contact resistance and the Brownian motion of the particles on the ETC should be analyzed. For this purpose, experimental and theoretical investigations on selected dispersions consisting of solid or liquid particles in the nanometer range in a continuous liquid phase are intended. The measurement results obtained with a stationary parallel-plate instrument, together with critically evaluated literature data, serve as a reliable database for analyzing the aforementioned effects on the ETC. Furthermore, the question should be answered to what extent the findings obtained for dispersions with solid particles can be transferred to those with liquid particles. Based on the experimental and theoretical considerations, a generalized prediction method for the ETC of dispersions with a continuous phase liquid should be developed.



We are looking for a graduated researcher with interests and competences in the field of thermophysical property research by experiment and theory. We offer an interdisciplinary and international working environment allowing for an excellent scientific and personal development.

Start: From July 2024

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