

**Thermophysical Property Research & Heat Engineering
at the Institute of Advanced Optical Technologies – Thermophysical Properties (AOT-TP)**

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Accurate knowledge of thermophysical properties of working fluids in chemical and energy engineering is necessary for the proper design or optimization of apparatuses and processes. In this context, a basic understanding and intensification of heat and mass transfer processes is often required. These aspects are linked to the subject areas Thermophysical Property Research & Heat Engineering dealt within the research activities of AOT-TP. A third area is the development and application of novel measurement, simulation, and prediction methods applied within the first two areas. Closely associated with its name, AOT-TP is active in the development and optimization of several – mainly optical – methods for the accurate determination of thermophysical properties over a wide range of thermodynamic states including harsh conditions.

The present contribution gives an overview of current research activities at AOT-TP. Besides fundamental research questions connected to specific systems from chemical and energy engineering, the development of corresponding experimental and theoretical methodologies will be discussed. Within thermophysical property research, recent objects of investigation cover, e.g., liquid organic hydrogen carrier systems, polymer melts, electrolytes, alkanes, ionic liquids, and particulate systems in form of microemulsions and nanofluids. Molecular dynamics simulations help to identify and quantify structure-property relationships which can be used for the development of prediction methods for specific properties of various fluid classes. Research activities related to heat engineering comprise experimental investigations of the condensation heat transfer of pure hydrocarbons and their zeotropic mixtures on single horizontal tubes and in corresponding tube bundles and the development of respective heat-transfer models. Furthermore, an analytical model for the effective thermal conductivity of heterogeneous systems such as nanofluids has been developed and undergoes further refinement. Additional experimental and modelling studies focus on the influences of parameters relevant to heat transfer during dropwise condensation of low-surface-tension fluids and hot stamping.