PRESS RELEASE

Extension of the thermo-technical laboratory at Fraunhofer IFAM Dresden provides new research methods

The thermo-technical laboratory at the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM in Dresden now offers a much broader portfolio of measurement techniques following modernization work carried out in recent weeks. With the help of the expansions, researchers and their customers now have more measurement options at their disposal to gain new insights in the field of thermal management. These are a new thermoelectric test rig for module characterization, a test rig for evaluating heating surfaces in tank boiling and a three-layer calorimeter for characterizing phase change materials.

Determining the thermal properties of materials is essential in many areas of application. For example, the thermal conductivity and heat capacity of a material are the important variables for thermal management. Measuring them as accurately as possible requires not only high-quality measurement technology, but also many years of experience in performing and evaluating the measurement results. Scientists at Fraunhofer IFAM Dresden have specialized in researching the thermal properties of materials in their business unit Energy and Thermal Management.

Among other things, an evaporator test rig has now been added to the thermo-technical laboratory. This enables the metrological characterization of evaporator surfaces during vessel boiling and the determination of heating power and heating surface superheat. In addition, the researchers can carry out cyclic thermal load tests with the aid of a new thermoelectric test rig, with independently controllable temperature for the hot and cold sides. Due to the adjustable temperature range from 25 °C to 600 °C, a cycle duration of about 10 min and an inert gas atmosphere, the trainer enables investigations of thermoelectric modules under practical conditions. Furthermore, it is now possible to characterize phase change materials (PCM) with a three-layer calorimeter. The measurement is carried out in a climatic chamber under defined heating and cooling cycles. Representative quantities of PCM (~100 ml) can be investigated in a standardized manner with regard to the heat storage capacity.

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The thermo-technical laboratory offers a wide range of possibilities for the experimental investigation of solids and fluids, with thermal characterization at the center of activities. Close networking with numerical calculation methods for design and measurement data evaluation supports the implementation of customer-specific test rigs. Among other things, Fraunhofer IFAM Dresden uses modern technology to analyze the extent to which industrial waste heat can be converted into electricity using special thermoelectric modules. This research topic has been gaining relevance in the energy sector for some time.

In addition to the newly installed equipment, the thermo-technical laboratory at Fraunhofer IFAM Dresden also has other modern measurement techniques to determine the thermal properties of materials. For example, the thermal conductivity at high temperatures can be determined using a high-temperature plate apparatus and the thermal conductivity at ambient conditions using a room-temperature plate apparatus. Both methods are particularly suitable for porous or anisotropic materials such as plastics, metals, ceramics and layered or fiber composite structures made of different materials.

With the aid of a hot-disk apparatus, which is also suitable for liquids and bulk materials, the scientists can also investigate volume-related heat capacities of materials. Other available methods include fluidic characterization and temperature-dependent density determination of materials as well as cycling tests for PCM storage.

Further information on the business unit Energy and Thermal Management at Fraunhofer IFAM Dresden.

These measures were co-financed by tax funds on the basis of the budget passed by the members of the Saxon state parliament.

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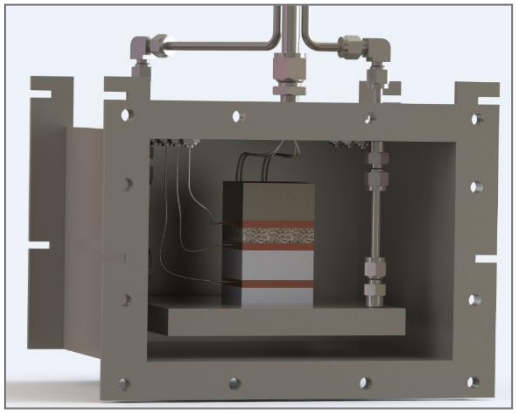
Test rig for metrological characterization of evaporator surfaces

Thermo-technical laboratory at Fraunhofer IFAM Dresden



High-temperature plate test rig for determining thermal conductivity

Pictures: Fraunhofer IFAM Dresden

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