Industrial Research at the Application Centre at Hahn-Meitner-Institut Berlin

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Abstract. The new centre for industrial applications NIXE (neutrons, ions and x-rays for engineering) at the Hahn-Meitner-Institut Berlin provides a large quantity of different methods for structural research. In this paper the focus will be set on the tomography facilities. There are two different tomography methods available: neutron tomography at the BER II research reactor and synchrotron tomography at the electron storage ring BESSY that is operated in cooperation with the Bundesanstalt für Materialforschung und –prüfung (BAM).

The new cold neutron radiography and tomography facility CONRAD is specially designed for the investigation of components and materials used in different industrial fields. Due to the very high flux of up to $3x10^9$ neutrons/(cm^2s) even comparably thick components and materials with relatively large attenuation coefficients can be investigated. Use of cold neutrons yields a much better contrast compared to thermal neutrons for materials with rather similar attenuation coefficients.

In contrast synchrotron tomography provides a very high spatial resolution of around 1-2 µm that makes it useful for detailed analysis of micro-cavities, micro-cracks and other structural conditions.

We present examples from different fields of industrial research and development, e.g. analysis of soot sediments in diesel particulate filters or in-situ investigations of the discharging of lithium batteries. Further examples provide new insights into the field of modern lightweight materials used in automotive and aviation industries.

Especially the combination of both complementary methods is very promising, because neutrons and x-rays have different element sensitivities.