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Vacuum FT-IR spectrometer: Research Tool at Synchrotron Infrared Beamlines

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Michael Joerger
Guenter Zachmann

In the 70s of the last century first attempts to make use of the advantage of bright and highly collimated e-synchrotron radiation not only in the short wavelength range (UV, X-Ray) but also in the long wavelength range (FIR, typically 400 to 10cm-1) failed. The theoretically expected advantage of the synchrotron radiation as bright but expensive IR sources could not be shown. Today the system parameters for the e-synchrotron beam generating radiation as well as for the optics design for guiding the synchrotron radiation to an IR beamline are well explored. Successful experiments providing new insight resulted in the adoption of synchrotron radiation as a radiation source for spectrometers and consequently an increase in the number of IR beamlines with spectrometers attached. Outstanding data have been published using these beamline spectrometer combinations in the field of IR microscopy and imaging [1], low temperature far IR ellipsometry [2] and high pressure physics [3].

In recent years the long wavelength IR spectral range (THz, typically <100cm-1), became of high interest due to new technologies and challenging applications [4]. The combination of high resolution and flexible vacuum FT-IR spectrometers installed at IR beamlines proofed to be an ideal combination for the study of the characteristics and new applications of IR and THz radiation.

In this presentation an overview of applications utilizing vacuum FT-IR spectrometers at e-synchrotron IR beamlines will be presented. The advantages of synchrotron radiation versus thermal radiation sources with respect to spectral range, resolution and scanning speed will be discussed as well as synchronization of the scanner to the e-synchrotron pulses, the use of automation options and modern detector technology [5].

References:

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Primary author: JOERGER, Michael (Bruker Optik GmbH, Rudolf-Plank-Strasse 27, 76275 Ettlingen, Germany)

Presenter: JOERGER, Michael (Bruker Optik GmbH, Rudolf-Plank-Strasse 27, 76275 Ettlingen, Germany)

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