T-ray spectroscopy of biomolecules: from chemical recognition toward biochip analysis - horizons and hurdles

In the recent years, there has been an increased interest in the exploitation of the far-infrared spectral region for applications based on chemical recognition. The fact that on the one hand many packaging materials are transparent for THz radiation and on the other hand the THz-spectra of many pharmaceuticals, illicit drugs, and explosives show very specific fingerprints show the potential that THz spectroscopy holds for identification of concealed substances by comparing the spectral signatures with the entries in a database. Yet, due to the lack of appropriate techniques the far-infrared region had for a long time be relatively unexplored, and therefore a detailed study of the far-infrared spectra and the character of the molecular vibrations that give rise to the characteristic spectral signatures can help to evaluate the applicability of THz spectroscopy and imaging for quality control, chemical recognition and biomedical applications.