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Title:High-resolution infrared spectroscopy with synchrotron sources
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Abstract:Most applications of synchrotron radiation lie in the ultraviolet and X-ray region, but it also serves as a valuable continuum source of infrared (IR) light which is much brighter (i.e. more highly directional) than that from normal thermal sources. The synchrotron brightness advantage was originally exploited for high spatial resolution spectroscopy of condensed-phase samples. But it is also valuable for high spectral resolution of gas-phase samples, particularly in the difficult far-IR (terahertz) range (1/λ ≈ 10-1000 cm⁻¹). Essentially, the synchrotron replaces the usual thermal source in a Fourier transform IR spectrometer, giving a increase of up to two (or even more) orders of magnitude in signal at very high-resolution. Following up on pioneering work in Sweden (MAX-lab) and France (LURE), a number of new facilities have recently been constructed for high-resolution gas-phase IR spectroscopy. In the present paper, this new field is reviewed. The advantages and difficulties associated with synchrotron IR spectroscopy are outlined, current and new facilities are described, and past, present, and future spectroscopic results are summarized. Crown Copyright © 2010 Published by Elsevier Inc. All rights reserved.
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