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Recent Methodological Developments in Nuclear Resonant Scattering with Synchrotron Radiation

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A review of progress made in synchrotron radiation based techniques

Summary

The year 2010 marks the 25th anniversary of the first successful demonstration of nuclear resonant scattering using synchrotron radiation. During this period, many different experimental approaches have been developed to observe and conduct meaningful scientific experiments in samples of mineralogical and biological interest. Among these, we can distinguish the development of high-resolution, tunable crystal monochromators, back-scattering crystals, polarization-based optics, interferometric techniques, and creation of of single-line absorbers for direct energy-domain measurements. Some of these are implemented for some subset of the dozen or so different Mossbauer isotopes with transition energies ranging from 6 to 70 keV. Currently, at least 5 different synchrotron beamlines are dedicated fully or partially for this purpose. Some of these facilities, like Sector 3-ID at the APS will be upgraded soon, while some newer facilities are also just coming on-line, like PETRA-III. We will to review the progress made at the APS and the upgrade plans for the 3-ID, the only dedicated beamline in the USA.

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