X-RAY ABSORPTION STUDIES OF LOCAL STRUCTURE WITH FEMTOMETER ACCURACY

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In the last years, the XAFS experimental techniques have undergo remarkable developments: (i) experiments with unprecedented accuracy and under extreme conditions of high pressure and temperature [1], (ii) experiments with nanoscale lateral resolution [2], that were not even conceivable just a few years ago, can nowadays be performed. New applications, stimulated by accurate experimental temperature-dependent XAFS measurements on Ge, ReO_3 and $SrFe_xTi_{1-x}O_3$, can be carried out. In parallel with the experimental techniques, XAFS theory and data analysis have made considerable progress. Femtometer accuracy in the determination of interatomic distances is now attainable [1, 2]. Therefore, new effects can be studied with femtometer accuracy, for example:

- isotopic effect on EXAFS and isotopic effect on the lattice dynamics and anharmonic properties of Ge^{70} and Ge^{76} (see [1] and Highlight ESRF 2008);
- materials with negative thermal expansion as ReO_3, AgO_2, etc. (see [3] and Highlight ESRF 2006);
- materials with Jahn-Teller (JT) effect, small radium polaron (WO_3) or with charge disproportionation as $SrFe_xTi_{1-x}O_3$ (see [4] and Highlight ESRF 2007);
- Solid solutions as $SrFe_xTi_{1-x}O_3$, $Th_{1-x}U_xO_2$ etc. (see [4,5] and Highlight ESRF 2007).

References

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