

Abstract

This work concerns the application of X-ray Absorption Fine Structure (XAFS) technique to disordered nanoclusters. An attempt has been made to understand the structure of disordered nanoclusters in three unique configurations - embedded nanoclusters in thin films, bimetallic nanorods synthesized via swift heavy ion irradiation and ayurvedic nanomedicine, each synthesized via a different technique, using complex and novel XAFS analysis methods. The objectives of these XAFS studies were respectively (i) to determine the composition and configuration of clusters in C layer of Pt/Ni/C multilayer film subjected to ion irradiation (ii) to understand possible mixing behavior in an otherwise immiscible Ag/Pt system resulting from local temperature/pressure increase brought about by the passage of heavy ions in the system (iii) to understand the structure of ayurvedic nanomedicine Rasasindura with the objective of finding scientific evidence towards its claimed non-toxicity. In parallel, the task of augmentation of the XAFS beamlines at the Indus-2 synchrotron source has been undertaken for studying such systems at extreme thermodynamic conditions, in particular high pressure and low temperature, which offer additional control parameters to derive insights into the phase diagram of nanoclusters.