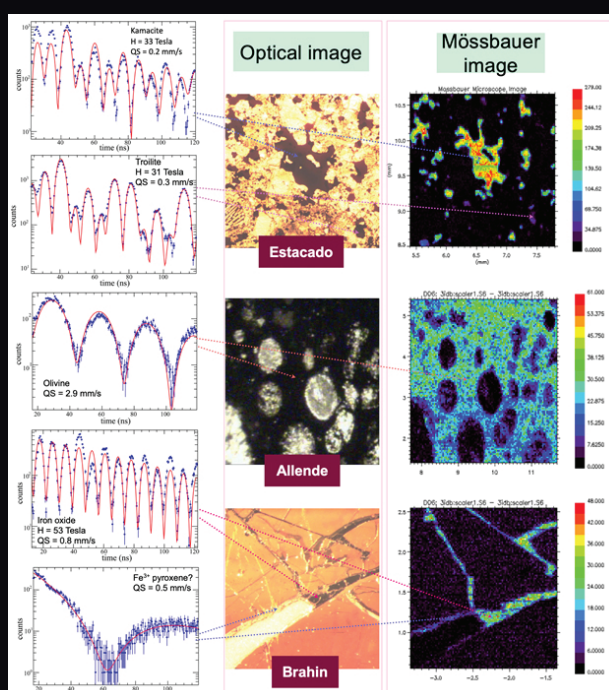


# E. Ercan Alp

## Mössbauer Spectroscopy and Microscopy in the Synchrotron Era

It's been 45 years since the idea of using a synchrotron source to excite the Mossbauer transitions was proposed at Argonne National Laboratory. Since then significant progress has been made in developing the methodology, instrumentation, and data analysis. A key discovery was made by a group of Argonne scientists in 1994 who measured phonon density of states. Later, application areas were extended into a wide range of scientific disciplines including condensed matter physics, chemistry, geology, and the life sciences. This talk will review the key issues addressed by nuclear resonant scattering methods in geophysics and geochemistry such as velocity of sound of Earth-bound minerals, iron valence, and isotope fractionation in the core-mantle boundary. Similarly, determination of possible pathways related to the functions of iron-containing biological systems or catalysts will be discussed. The extension of the method to more than a dozen isotopes provides wide-ranging tools to study the interplay between magnetism and superconductivity in new quantum materials like pnictides. One exciting aspect is the development of Mössbauer microscopy applied to meteorite research. The Argonne team has been selected to examine the Hayabusa-2 Sample Return Mission samples next year. This presentation will review modern applications, and provide a perspective view.



E. Ercan Alp received his B.Sc. and M.Sc. degrees from the Middle East Technical University in Ankara, and his Ph.D. from Southern Illinois University. He joined Argonne in 1984. He worked with the first group of scientists to prepare the scientific case for the Advanced Photon Source. He is known for his pioneering work in nuclear resonant x-ray

spectroscopy and inelastic scattering with synchrotron radiation. He formed the inelastic x-ray scattering group at the APS, and he was responsible for the design and construction of two beamlines dedicated to nuclear resonant and inelastic x-ray scattering. He was a member of international science advisory committees for many synchrotrons. Currently, he is the Chair of SESAME Scientific Advisory Committee. He was the chair of Forum on International Physics of the American Physical Society in 2014. He has published over 300 papers, book chapters, and chaired many international conferences. He is an elected member of the Academy of Science, Turkey.

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