

# Dynamic Response of Reactive Materials

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The dynamic response of reactive materials is not well understood in an atomistic/molecular level, which requires fundamental, real-time materials data regarding how they deform, fracture and combust; how they evolve structurally and chemically to metal-gas combustion, intermetallic reactions, and thermite products; and how they release chemical energy. In this talk, we will present our effort to acquire such information through small-scale, tabletop experiments on reactive materials in advanced nm-scale microstructures such as bulk metallic glass, lamellae multilayers, and high-pressure cold-sintered composites under rapidly thermal and mechanical ignitions. A few examples will be presented to exploit structural and chemical evolutions associated with (i) mechanical deformation and transformation, using time-resolved x-ray diffraction and dynamic-diamond anvil cell (d-DAC), (ii) fracture mechanics, using time-resolved micro-spectroscopy with high speed camera, and (iii) chemical reactions of reactive fragments, using time-resolved synchrotron x-ray diffraction and time-resolved optical spectroscopy.

## Biography:

Dr. Yoo is Professor of Department of Chemistry and Institute for Shock Physics at Washington State University. Dr. Yoo's research is on fundamental materials problems under extreme pressure-temperature conditions. His research utilizes static and dynamic high-pressure capabilities coupled with the state-of-the-art laser spectroscopic methods and x-ray diffraction and spectroscopy at the national synchrotron and neutron facilities. Prior to his arrival at WSU, he worked for nearly 20 years at the Lawrence Livermore National Laboratory where he developed and led a large multi-disciplinary research group in High Pressure Physics and earned twice the DOE awards (1995 and 2006) for *Excellence in Weapons Materials Research*. Professor Yoo received his Ph.D. in Physical Chemistry in 1986 from UCLA and served as a vice President for the AIRAPT and co-chaired a APS-SCCM/AIRAPT joint conference in Seattle, 2013

