Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Mechanical Properties of Nanoceramic Silicon Carbide IPIDAPO OJO, MALEK ABUNAEMEH, CYDALE SMITH, CLAUDIU MUNTELE, DARYUSH ILA, Alabama A&M University, ALABAMA A&M UNIVERSITY TEAM — Generation IV nuclear reactors will use the TRISO fuels, a type of micro fuel particle. It consists of a fuel kernel coated with four layers of isotropic material. One of the materials considered for these layers is silicon carbide ceramic. This lightweight material can maintain chemical and dimensional stability in adverse environments at very high temperatures up to 3000 $^\circ$ C, and it is chemically inert. It is widely used as a semiconductor material in electronics because of its high thermo conductivity, high electric field break down strength, and high maximum current density, which makes it more desirable than silicon. Silicon carbide has a very low coefficient of thermal expansion and has no phase transition that would discontinue its thermal expansion. At the Center for Irradiation of Materials (C.I.M.) we are developing a new fabrication process for nanopowdered silicon carbide for TRISO fuel coating purposes. We also study the mechanical properties of the material produced. Among the different test being performed are particle induced X-ray emission (PIXE) an Rutherford backscattering spectroscopy (RBS). The mechanical properties of interest are hardness (measured by Vickers Hardness machine), toughness (measured by the Anstis equation, K_{IC}= 1.6 x 10^{-2}(E/H)$^{1/2}$(P/$C_0^{3/2}$, where P=load, C_0=crack length, E=Young's modulus and H=Vickers Hardness), tensile strength and flexural strength (measured by a three point bend test). Results will be presented during the meeting.

Malek Abunaemeh
Alabama A&M University

Date submitted: 04 Dec 2008 Electronic form version 1.4