NEER FY 2001 PROJECT ABSTRACT	
Grant Number:	01ID14116
Project Title:	Development of a Robust Tri-Carbide Fueled Reactor for Mutimegawatt Space Power and Propulsion Applications
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Abstract:	The objective of this research program is the development of an ultracompact and ultralight reactor design based on an innovative Square-lattice "Honeycomb" (SLHC) uranium tri-carbide fueled core for multimegawatt space nuclear power and propulsion applications. Included in this proposal is the nuclear and thermal fluid design analysis of the reactor system and the development and characterization of mixed uranium/refractory metal tri-carbide nuclear fuels, (U, Zr, X)C where X=Nb, Ta, Hf, or W. The primary driver for the innovative SLHC design is the design simplicity of thin fuel wafers leading to net shape fabrication, essential to processing of super hard tri-carbide fuels. Power scaling is easily achieved by adjusting the thickness of the fuel wafers. However, the most improved design feature of tri-carbide fuels is the elimination of a protective carbide coating that has severely limited the endurance and temperature performance of Rover/NERVA reactor fuels. This effort will support two graduate students and two undergraduate students and would benefit basic nuclear engineering research into both compact, high performance reactor design and advanced fuel development involving solid-solution, mixed carbide nuclear fuels with applications in next generation space power and propulsion systems. Advanced reactors and nuclear fuels are enabling technologies for lower cost, high performance systems for use in future manned missions and cargo transport to the moon or mars, unmanned explorations of the outer planets, and orbit transfers of satellites or other space-based assets.