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RF Plasma Torch System for Metal Matrix Composite Production in Nuclear Fuel Cladding[1] EDDIE HOLIK III, Texas A&M University — For the first time in 30 years, plans are afoot to build new fission power plants in the US. It is timely to develop technology that could improve the safety and efficiency of new reactors. A program of development for advanced fuel cycles and Generation IV reactors is underway. The path to greater efficiency is to increase the core operating temperature. That places particular challenges to the cladding tubes that contain the fission fuel. A promising material for this purpose is a metal matrix composite (MMC) in which ceramic fibers are bonded within a high-strength steel matrix, much like fiberglass. Current MMC technology lacks the ability to effectively bond traditional high-temperature alloys to ceramic strands. The purpose of this project is to design an rf plasma torch system to use titanium as a buffer between the ceramic fibers and the refractory outer material. The design and methods of using an rf plasma torch to produce a non-equilibrium phase reaction to bond together the MMC will be discussed. The effects of having a long lived fuel cladding in the design of future reactors will also be discussed.

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