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Impedance Dynamics in the Self-Magnetic Pinch (SMP) Diode on the RITS-6 Accelerator* TIMOTHY RENK, MARK JOHNSTON, JOSHUA LECKBEE, TIMOTHY WEBB, MICHAEL MAZARAKIS, MARK KIEFER, Sandia National Laboratories, NICHELLE BENNETT, National Security Technologies — The RITS-6 inductive voltage adder (IVA) accelerator (3.5-8.5 MeV) at Sandia National Laboratories produces high-power (TW) focused electron beams (<3mm diameter) for flash x-ray radiography applications. The Self-Magnetic Pinch (SMP) diode utilizes a hollowed metal cathode to produce a pinched focus onto a high Z metal converter. The electron flow from the IVA driver into the load region complicates understanding of diode evolution. There is growing evidence that reducing cathode size below some "optimum" value in order to achieve desired spot size reduction results in pinch instabilities leading to either reduced dose-rate, early radiation power termination, or both. We are studying evolving pinch dynamics with current and x-ray monitors, optical diagnostics, and spectroscopy, as well as with LSP [1] code simulations. We are also planning changes to anode-cathode materials as well as changes to the diode aspect ratio in an attempt to mitigate the above trends and improve pinch stability while achieving simultaneous spot size reduction. Experiments are ongoing, and latest results will be reported. [1] LSP is a software product of ATK Mission Research, Albuquerque, NM. *Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. De-partment of Energy's National Nuclear Security Adminis-tration under contract DE-AC04-94AL85000.

Timothy Renk
Sandia National Laboratories

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