Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

The Role of Thermoelectromagnetic Convection in Semiconductor Crystal Growth BRENT HOUCHENS, Rice University — Semiconductors are often grown in magnetic fields to damp or control the melt motion. In high magnetic fields, a nearly quiescent melt can be achieved. The leading order electromagnetic damping (by way of the Lorentz body force) increases with the square of the strength of the applied magnetic field. However, experimentalists discovered that increasing the magnetic field strength past a certain threshold caused the melt to transition from a nearly quiescent state to an oscillatory flow. It was hypothesized that second order thermoelectric currents could be responsible for the oscillatory flow. These Seebeck electromotive currents are generated at the solidification front where gradients of thermoelectric power and temperature are not parallel. This additional electric current also interacts with the applied magnetic field, providing a new flow mechanism, thermoelectromagnetic convection (TEMC). Here, the basic principles of TEMC will be discussed, and results from a prototypical model will be presented.

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Date submitted: 04 Aug 2006 Electronic form version 1.4