1011-49-46 **Marian Bocea\*** (`bocea@math.utah.edu`), Department of Mathematics, University of Utah, 155 South 1400 East, JWB Room 233, Salt Lake City, UT 84112. *New variational principles for models of dielectric breakdown and polycrystal plasticity.*

$\Gamma$-convergence results for a general class of power law functionals are obtained, providing new variational principles for several problems in Materials Science, such as the analysis of rigid perfectly plastic polycrystals and the study of (first failure) dielectric breakdown of a polycrystalline insulator. A number of highly nonlinear PDEs which arise naturally in our analysis are discussed. (Received August 03, 2005)