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Dielectric Properties of PZT 95/5 During Shock Compression Under High Electric Fields[1] ROBERT SETCHELL, STEPHEN MONTGOMERY, DAVID COX, MARK ANDERSON, Sandia National Laboratories — Shock-induced depoling of the ferroelectric ceramic PZT 95/5 is utilized in pulsed power devices. High electric fields are generated within a ceramic element when the depoling current is passed through a large load resistor. Under these conditions, a portion of the depoling current is retained on the element electrodes to account for capacitance. This effect is governed by the dielectric properties of both unshocked and shocked PZT 95/5 as the field develops during shock transit. Previous studies proposed either constant or relatively simple relaxing behavior for dielectric properties on either side of the shock front. However, interpreting these experimental results is complicated by possible field effects on depoling kinetics. Recent studies have used different experimental configurations to better isolate the dielectric behavior. Multiple PZT 95/5 elements are displaced in the direction of shock motion to allow for sequential charging of unshocked and shocked samples. These experiments show a complex dielectric behavior for which a simple relaxation model is inadequate.

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