

# New Transforming Materials with Unprecedented Physical and Mechanical Properties

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## DESCRIPTION OF WORK

- ◆ Quantitative criteria for hysteresis
- ◆ Hysteresis in big first order martensitic phase transformations is related to compatibility, not pinning of interfaces as was previously thought
- ◆ By tuning lattice parameters to satisfy special conditions (middle eigenvalue of a certain matrix calculated from the lattice parameters is 1), the hysteresis drops dramatically.

## Publications

- ◆ R. D. James and Z. Zhang, A way to search multiferroic materials with 'unlikely' combine physical properties, in Magnetism and Structural Functional Materials (ed., Lluís Manosa, An Planes, Avadh Saxena), Springer Series in Science, vol. 79, Springer-Verlag (2005).

## MAJOR OBSERVATIONS

- ◆ New quantitative understanding of what causes hysteresis in martensitic phase transformations
- ◆ Use of the resulting criteria to discover new low hysteresis alloys

