

Magnetostrictive Thin Film Galfenol for MEMS Applications

Rajneeta R. Basantkumar, William P. Robbins, Bethanie J. H. Stadler (PI)

Department of Electrical and Computer Engineering, University of Minnesota

● Galfenol-coated Si_3N_4 double-clamped cantilevers

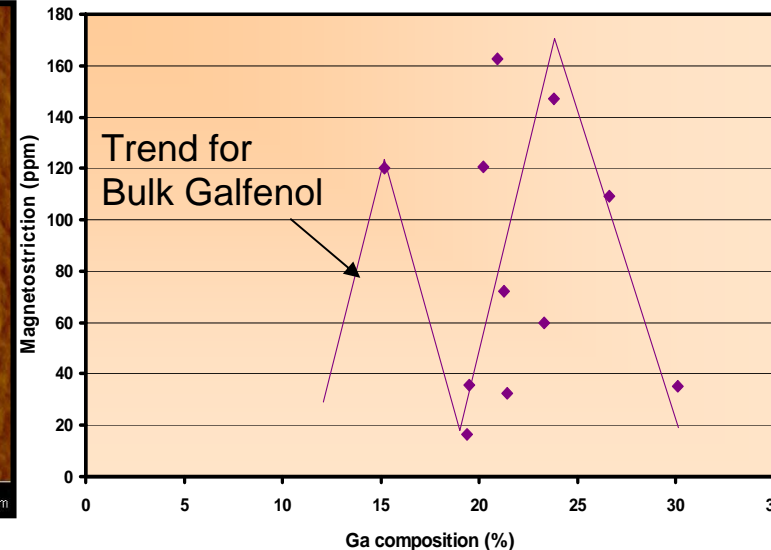
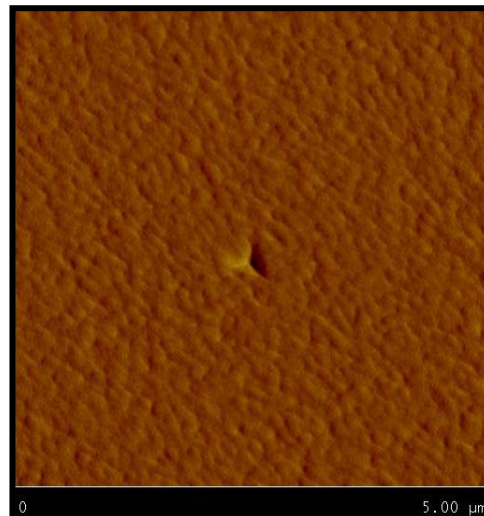
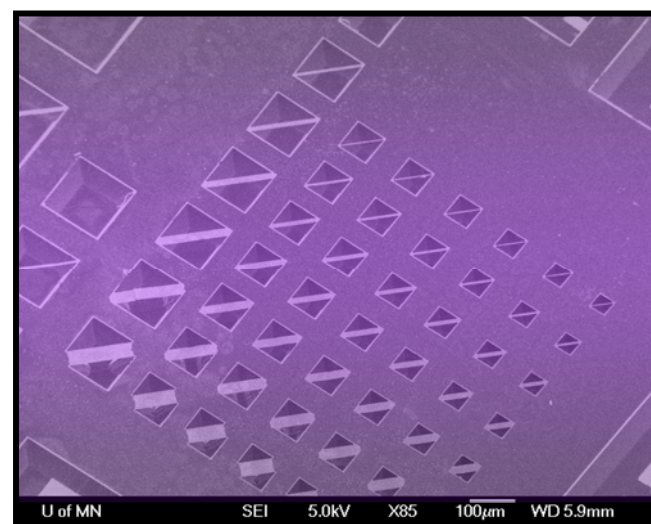
- ◆ Beams were magnetically actuated
- ◆ Applications will include microvalves, micropumps, MEMS sensors and actuators

● Mechanical Properties

- ◆ First to measure hardness (5 – 9 GPa) and Young's Modulus (136 -187 GPa) of Galfenol thin films
- ◆ Young's Modulus of thin films is higher than bulk values

● Magnetostriction

- ◆ Measured magnetostriction up to 163 ppm
- ◆ Double peak trend of magnetostriction versus %Ga is similar to bulk Galfenol



- Publications: R.R. Basantkumar, B.J.H. Stadler, R. William, E. Summers, "Sputtered Galfenol Thin Films," *IEEE Transactions on Magnetics* **42** 3102 (2006).