



Ni-Mn-Ga/polymer composites

MURI review

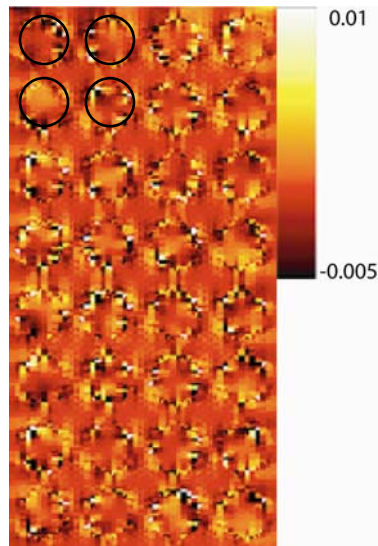
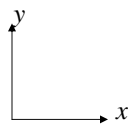
September 9 2005

Jorge Feuchtwanger



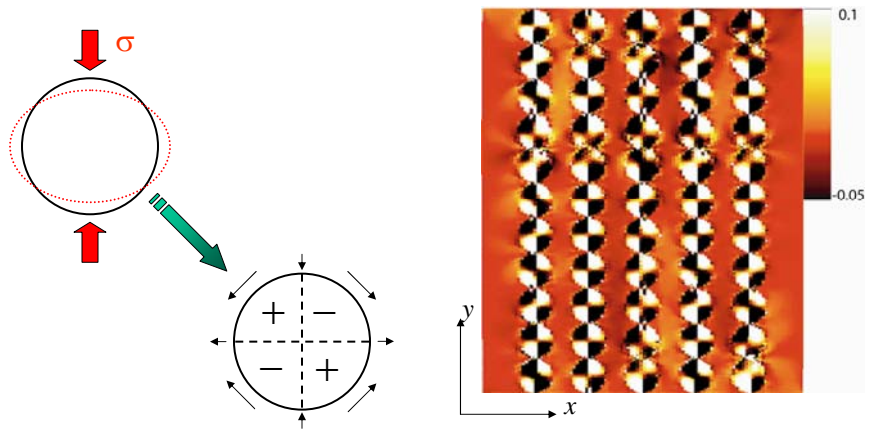
FEA evenly spaced particles

xy compressive stress



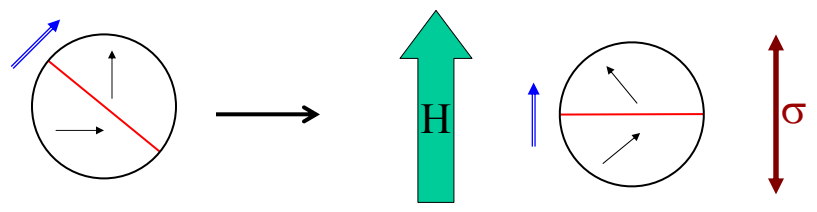


Stress on particles



Variant effect on orientation

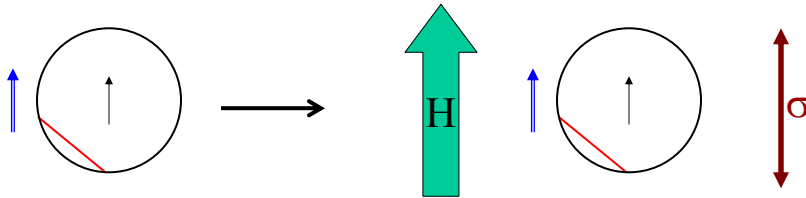
Equivariant particle



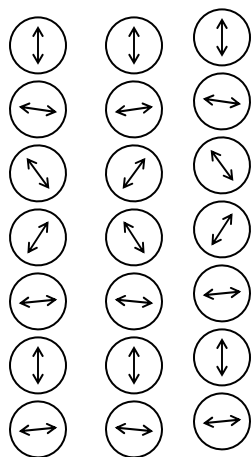


Variant effect on orientation

Mostly single variant particle



Aligned vs. oriented



Aligned

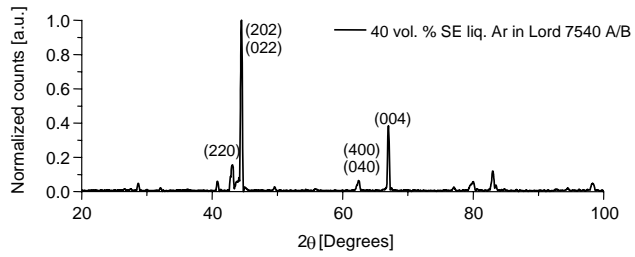
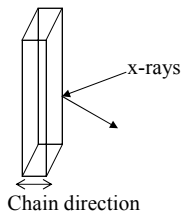
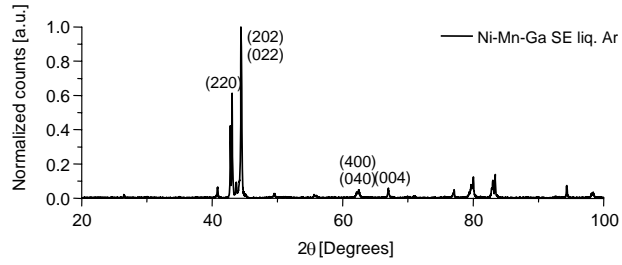
\updownarrow *c*-axis



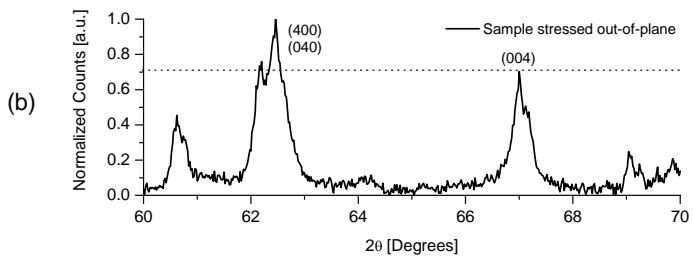
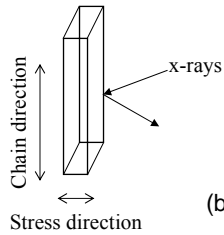
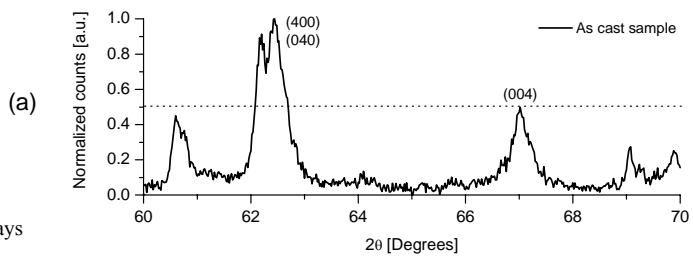
Aligned and oriented



XRD

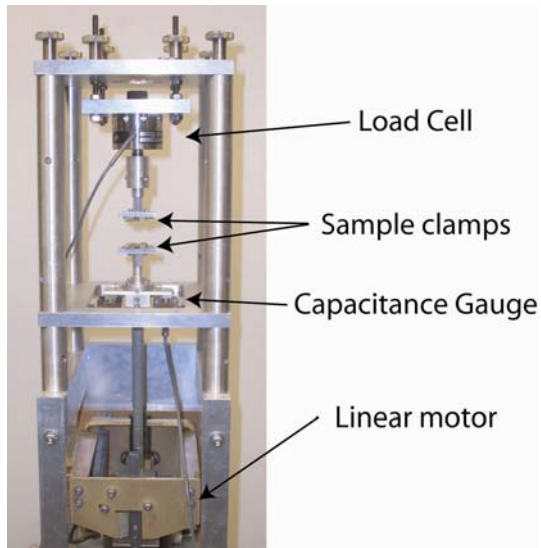


X-ray diffraction

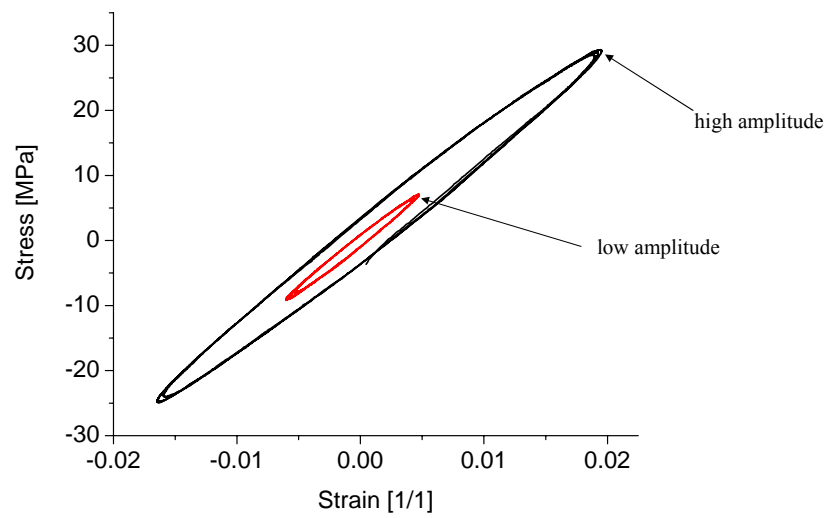




Mechanical tester

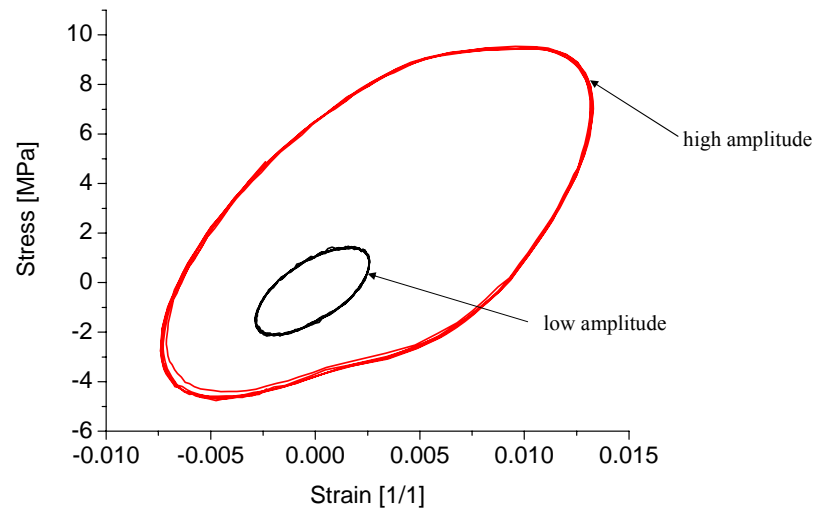


Polyurethane





FSMA loaded composite

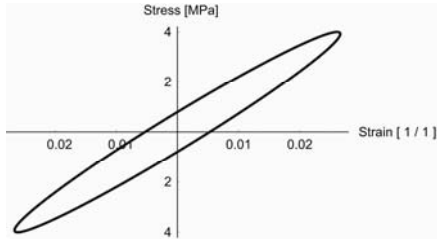


Mechanical Testing

Sample	Load (MPa)	Loss ratio	Tan δ
Polyurethane	17	17%	0.1196
Fe 20 vol. %	10	43%	0.7376
Ni-Mn-Ga 20 vol.%	1.5	63%	1.0296
Ni-Mn-Ga 20 vol. %	10	67%	1.1386
Ni-Mn-Ga 20 vol. %	16	77%	1.1616

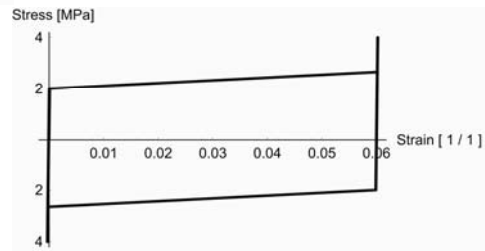


Model

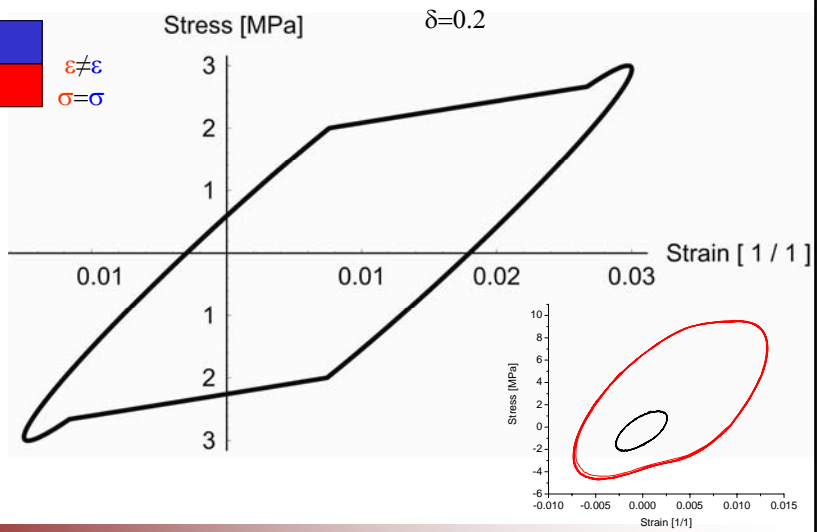
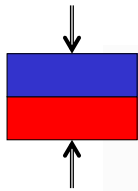


Polymer

FSMA

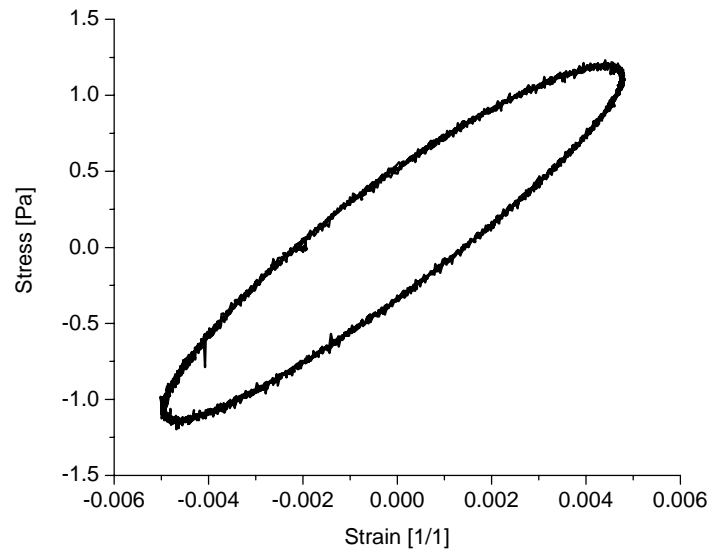


Constant stress

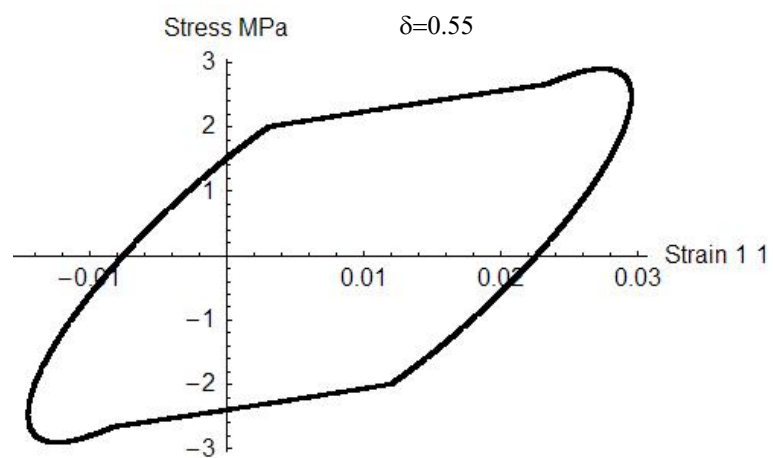




Fe powder loaded



Additional loss





Conclusions

- Particle chains increase stress on particles
- Stress appropriate for twin motion
- Mechanical loss is a function of stress amplitude
- Numerical model captures main features
- Loss due to more than sum of parts