An ER fluid is typically a suspension consisting polarizable nano/micro-meter particles well dispersed in a non-conducting, low-viscosity medium.

ER fluid transformed into a SOLID upon the application of electric field ~1kV/mm

Upon the removal of E-field the ER fluid is instantaneously transformed back into a LIQUID

Liang, 2004
Mechanism and Applications of ER Fluids

**ER EFFECT**
- Viscosity increase ≈ 10,000 times
- Instantaneous response ≈ 1mS
- Reversible liquid ⇔ solid change

**ER APPLICATIONS**
- Vibration control of structures
- Shock absorbers and dampers
- Torque transfer devices

Magnetorheological (MR) fluids

Liang, 2004
Controllable Fluid Devices with ER or MR Fluids

Objectives

• Development and characterization of high performance ER and MR fluids
• Evaluation of ER fluids as damage sensors for FRP module joint response detection
• Exploration of ER or MR fluids for vibration control of smart structures
• Development of controllable-fluid devices for structural health monitoring of civil structures