# TOI LAB.

## [Computational Solid Mechanics (Modeling and Simulation of Materials and Structures)]

**Department of Mechanical and Biofunctional Systems**

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Department of Systems Innovation

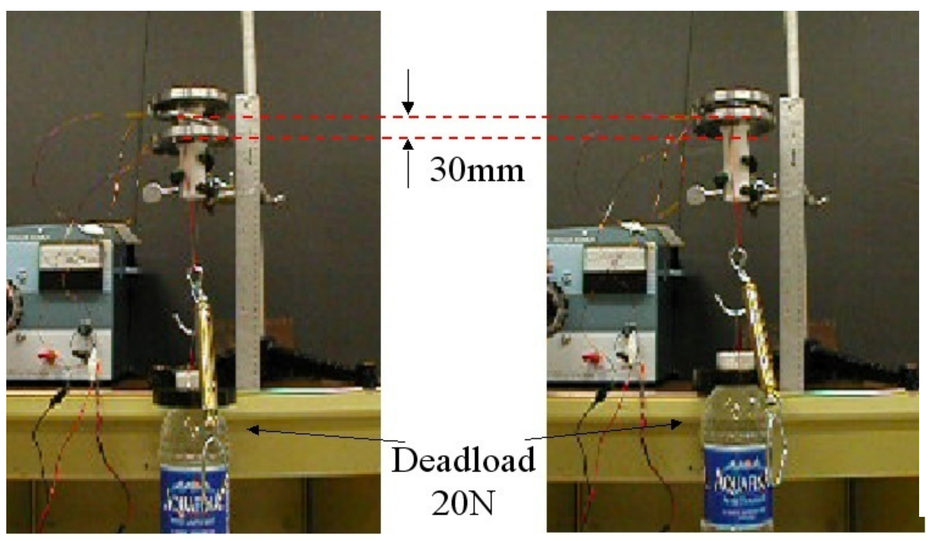
**Computational Solid Mechanics**

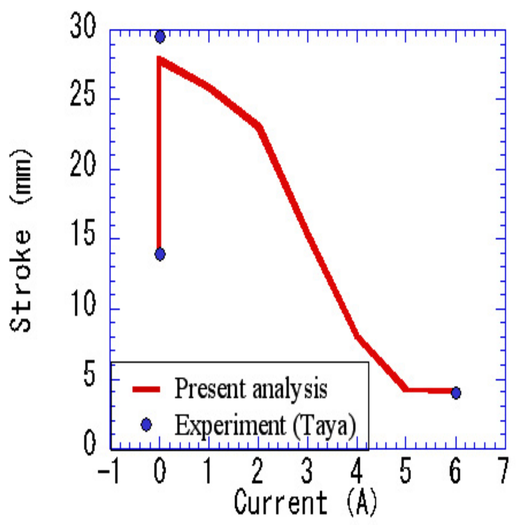
# Computational Solid Mechanics

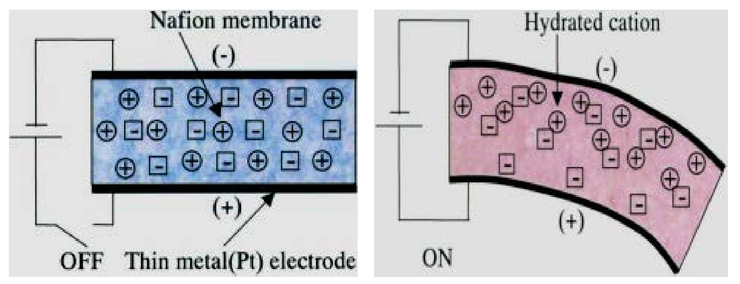
## Modeling and Simulation of Materials and Structures

Toi Lab is developing numerical simulation methods such as finite element method and applying those to engineering design analysis and advanced technology to solve multi-field, multi-scale problems of materials and structures.

- ◆ Material Engineering: Modeling of advanced functional materials (SMA, CP ) and devices
- ◆ Damage Mechanics: Mesomechanics evaluation of material damage and structural lifetime
- ◆ Structural Engineering: Nonlinear, multi-field (magnetic, thermal, mechanical) analysis
- ◆ Industrial Applications: Applications to machinery, nuclear power plants and constructions

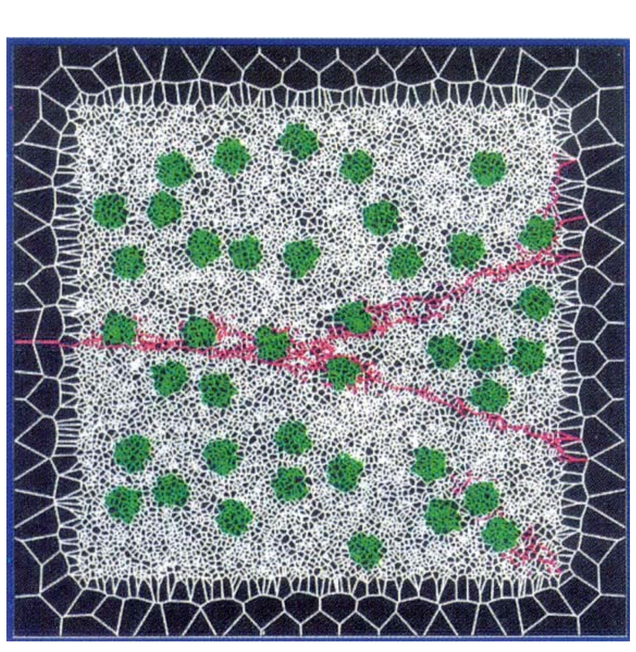


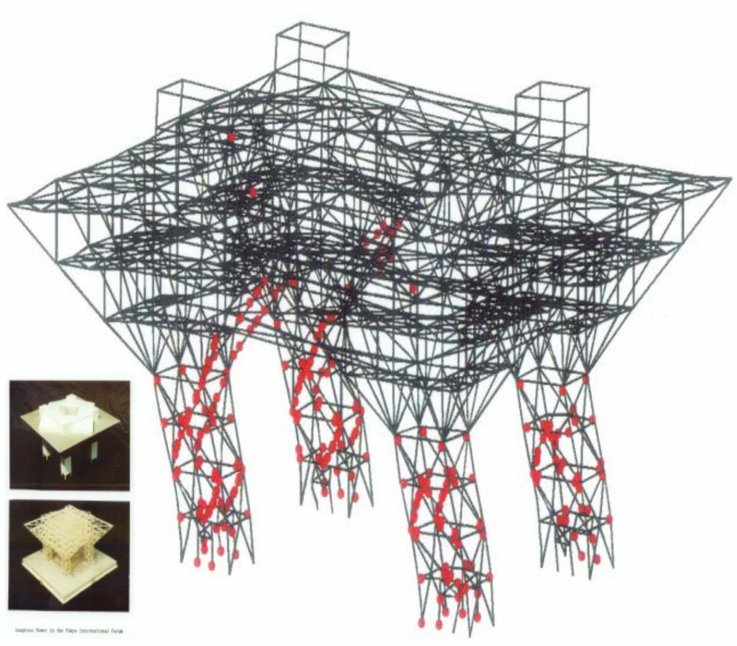




Magneto-superelastic response of FSMA actuator

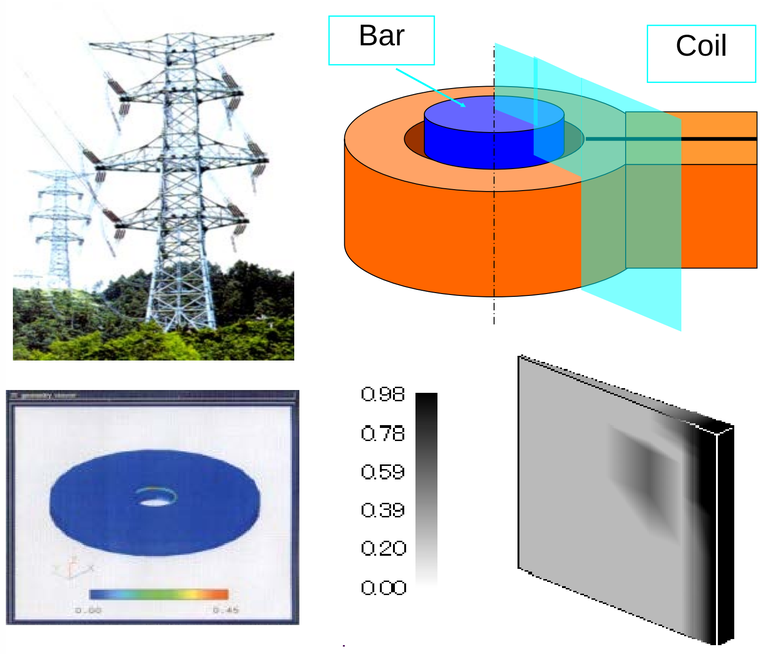
Electrochemical-mechanical response of CP actuator



Fracture of two-phase material
(Alumina+Zirconia particles)



Plastic collapse of framed structures
(Adaptively shifted integration method)




Embrittlement cracking in hot-dip galvanization
Phase transformation in induction hardening
(Electro-magnetic, thermal, mechanical)