Temperature distribution measurement of polymer by using electrical capacitance tomography

**Background**

Polymer pellets by using waste plastic

→ The pellets is mixed various kinds of polymer.

- Temperature distribution is unknown at cooling process of polymer.
- The products occurs warpage or cracks.

Extrusion moldings need to measure process temperature distribution.

**Measurement theory**

*<1> Visualization of concentration distribution by using relative permittivity distribution*

- Capacitance are measured.
- $C = SE$
- Relative permittivity distribution is calculated.

*<2> Relationship between relative permittivity and temperature of plastic*

- Relative permittivity of plastic are the function of temperature $T$ and measurement frequency.

**Experiments**

- Condition
  - Plastic: Black polymethyl methacrylate (PMMA) pellets
  - Heating method: Laser (wavelength : 632nm)
- Result
  - Relative permittivity increase with heating time elapsed.

**In the future**

- Temperature distribution is calculated by combination of ECT technique and the relationship between the temperature and the relative permittivity.