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Introduction to Dye Sensitized Solar Cell (DSC)

1. Introduction
DSC is a low-cost, high-efficiency solar cell based on dye-sensitized colloidal TiO₂ films, converting solar energy to electric energy. Also known as Photoelectrochemical cell or Graetzel cell.

2. Goal
Build an improved DSC with higher efficiency based on photonic bandgap effect.

3. Main Experimental Procedures
- Deposition of polystyrene (PS)
  - Vertical deposition or spin coating
- Infiltration
  - Fill in TiO₂ sol gel
- Calcinations
  - Evaporation of PS at 450 °C
  - Obtain inverse TiO₂ structure
- Injection of dye molecules
  - Soak in dye solution
  - Responsible for solar-electric energy conversion

4. Expected results

5. Theory behind
Whenever the incident light with a wave length \( \lambda \) satisfy the Bragg’s Law, light will be trapped inside cavity. Light interaction with dye molecules can be enhanced. This will then amplify the photogeneration in DSC and thus a higher photon-to-electron conversion efficiency can be obtained.