TEM is a useful tool for the analysis of the structure and size of polymers. The following are some basic information about polymers, and what I have learned in this course.

My project is involved in synthesis of amphiphilic copolymers by anionic polymerization, so let me introduce this first.

Amphiphilic polymers can self-assemble and have different structures in different solvents. Dendrimer, another polymer, can form holes in its structure, which is useful in drug and gene delivery.

**Contrast Enhancement**

How to prepare a good-quality grid for polymer is what we seek in this course.

As for amphiphilic polymer, I first precoated a thin film of Formvar on the grid, then carbon-coated it, and then added uranyl acetate to the polymer on the film.

As for hydrophobic polymer, it was not soluble in water, so other ways were tried.

**Polystyrene by anionic polymerization may cause partial crystallization.**

**Polymer crystal**

Formation of polymer crystals is another method I pursued. By using TEM I was able to look into the crystal structure. Polymers with stereo-regular structures can crystallize. Their chain structures are shown as follows:

- **Lactathetic**
- **Syndiotactic**
- **Atactic**

**X-ray Microanalysis**

X-rays are generated when an electron beam hits the atoms of a specimen. Different elements within the specimen generate X-rays of unique energies. An energy dispersive spectrometer can detect all the elements in a specimen during a single run.

**Electron Diffraction**

Electrons that penetrate the specimen are diffracted to produce an image. Materials are classified according to the arrangements of atoms in their unit cells. Materials that produce single crystal, like molybdenum trioxide, generate a pattern of discrete spots. In the diffraction pattern of poly-crystalline materials such as Au, the spots converge to form concentric rings.

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