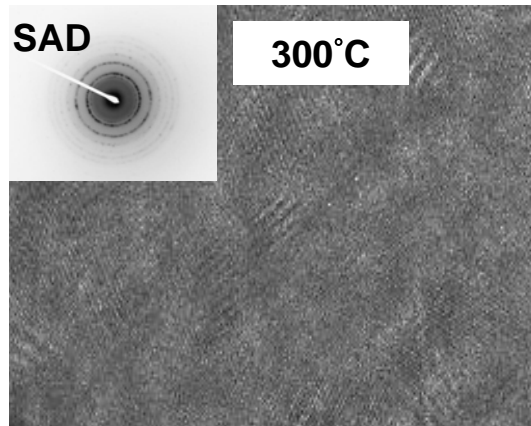
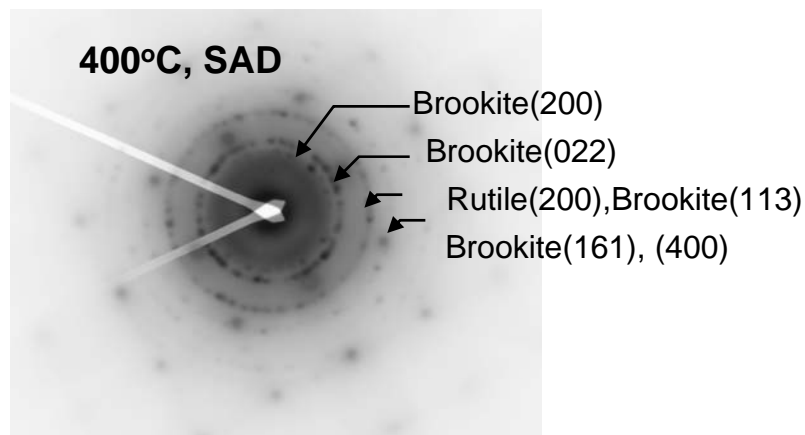


# A study of stress and microstructure evolution in TiO<sub>2</sub> thin-films derived from solution methods

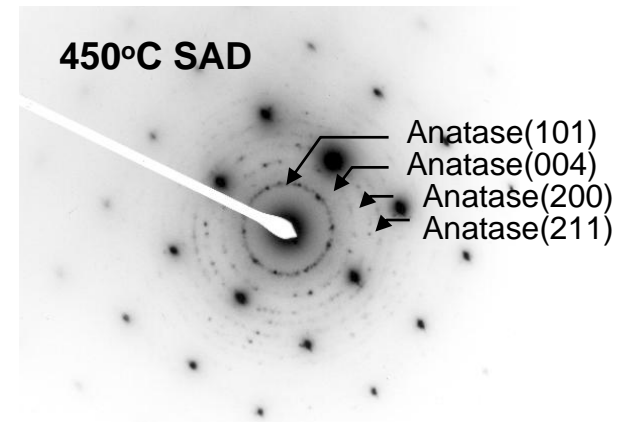
1. In hydrolysis- and condensation- limited sol-gel derived TiO<sub>2</sub> thin films, nanocrystalline particles of rutile are formed at low temperatures (200–300 °C) (SAD = selected area diffraction)



2. At ~400 °C, the rutile grains which formed between 200–300 °C transform to brookite.



3. At temperatures greater than ~430 °C anatase grains nucleate at rutile and brookite boundaries. The entire film transforms to anatase.



4. MOSS measurements indicate that nanocrystalline particle formation has little effect on stress evolution but that bulk crystallization produces large tensile stresses.

