In situ X-ray investigation of the formation of metallic silver phases during the thermal decomposition of silver behenate and thermal development of photothermographic films

Metallic silver formation, resulting from the thermal decomposition of silver behenate, AgBe, and from the thermally induced reduction of AgBe incorporated into a photothermographic imaging construction, has been compared by in situ x-ray investigation. In the case of the thermal decomposition of individual AgBe crystals, the main factor that determines the growth of the silver particles is the change in the AgBe crystal structure, leading to the formation of intermediate mesomorphic phases that still retain characteristic layer structure. By contrast, development of AgBe-containing photothermographic films generates silver particles by the reduction of intermediate silver complexes, which are in a liquid state during the development process. The silver nanoparticies resulting from these processes exhibit different sizes and morphologies that are important for optimizing the optical properties of photothermographic films.