

Synthesis of graphite ultrathin films from sucrose

Yasushi SONEDA, Yuya Kado

Presenting author's e-mail: y.soneda@aist.go.jp

Research Institute of Energy Frontier, National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki 305-8569, Japan

ABSTRACT

We have investigated the synthesis of graphite ultrathin films with thickness of 50-500 nm and few cm square in size by using spin coated polymer films on glass substrate as a precursor. We have reported that poly-benzimidazobenzophenanthroline ladder polymer (BBL) and polybenzoxazine (PBO) are suitable precursors to produce the high crystallinity and highly oriented graphite ultrathin films by heat treatment up to 3000 ° C. In the case of BBL, the self-standing polymer films prepared by spin-coating gave the high crystallinity graphite film. On the other hand, the spin-coated PBO was graphitizable when it was carbonized on the glass substrate, but the high temperature treatment for the carbon films from free PBO films resulted in the formation of turbostratic carbon films. This implies that PBO is graphitized due the stress graphitization because of adhesion of polymer with glass during the carbonization process.

By applying the same procedure, we could synthesize the highly oriented graphite films with sub-micron meters thickness from sucrose which is known as typical precursor for non-graphitizable carbon, although the resultant graphite films contained a number of holes and torn due to the less carbon yield of precursor molecules.