Synthesis and Characterization of Pyrolytic Graphite from Polyimide Film, and Manufacture of X-ray Condenser Devices

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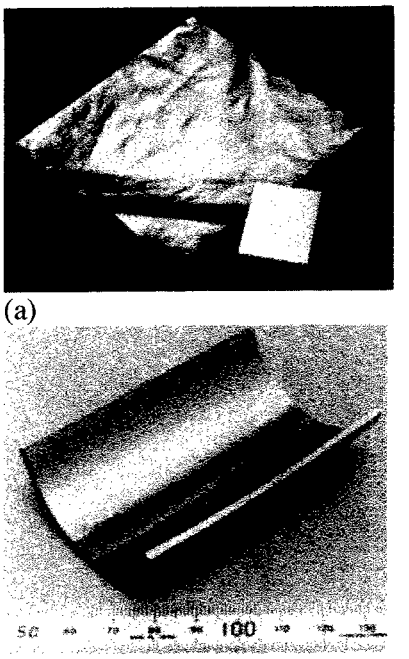
High-temperature heat treatment (HTT=3000℃) of molecular oriented polyimide film yielded a high quality graphite film, composed of thin graphite layers with 6～7nm in thickness. The graphititzation (hexagonal lattice formation) reaction depends on the heat-treated temperature (HTT), but the orientation of the lattice (graphite layer formation) preferentially proceed from the surface of the film. The graphite films have various characteristics forms on heat-treated condition in appearance, and we manufactured sheets of high quality and good flexibility. The graphite sheets from this manufacturing are above expanded graphite sheets in various physical and mechanical characteristics.



(a)

(b)

Fig. 1 (a) Flexible graphite sheet and block. (b) Toroidal type graphite X-ray condenser device (1/3 part of the whole device).

High-quality and highly oriented graphite block was produced from polyimide films of 25 μ m thick, which is particularly suitable for constituting optical components for X-ray monochromater. We have developed single-bent and double-bent graphite X-ray condenser devices. The mosaic spread of the diffraction lines using this device was in the order of 0.4 degrees, which enabled X-ray condensation by up to a factor of 10 times for a single-bent type condenser device and about 200 for a toroidal type condenser device.

References

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