

TRANSMITTED LIGHT MICROSCOPY OF GRAPHITE*

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ABSTRACT

Recently developed polishing techniques permit transmitted light microscopic examination of manufactured graphites. Specimens are mounted in resin and thinned by polishing techniques similar to those used for petrography. With these techniques, negligible break-up occurs in the sample thereby permitting examination of relatively large intact regions.

A comparison of transmitted and reflected light microscopy shows transmission improves contrast at the edges of small pores. This yields better definition of their shape and relationship with surrounding filler or binder materials. Structural features within graphite which may be resolved include lamellar networks of imperfections. These networks correspond to the system of grooves commonly observed by replica electron microscopy of cathodically etched graphite. In addition to these networks, transmission microscopy reveals carbon black filler additions, and the boundaries between filler and binder constituents. Thus transmission microscopy reveals a variety of features formerly unresolved by reflection microscopy.

The usable range of magnifications which may be applied in transmitted light studies extends from photomacrographic examination of porosity patterns at less than 20x to oil immersion microscopy at 1000x.

Samples prepared for transmitted light microscopy may also be examined by transmission in the electron microscope at much higher magnifications. The identification of regions examined by electron microscopy in terms of neighboring constituents or porosity is facilitated by prior optical examination. Transmitted light microscopy thus not only increases the information on graphite which may be obtained optically but also improves the interpretation capabilities of electron micrographs.

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