

Stepwise preparation of petroleum-based impregnation pitch for synthetic graphite

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In the synthetic graphite production, the impregnation pitch (IP) plays an important role to enhance the properties such as density, strength, modulus, and etc. The IP requires relatively low softening points and high coking values. However, they are very difficult to achieve simultaneously, due to their trade-off relationship and inherent complexity in petroleum residue. We introduce a stepwise preparation technique to synthesize impregnation pitches from pyrolysis fuel oil (PFO), a residue from petroleum refinery. The stepwise technique is composed of the initial pressure treatment up to 70 bar followed by the second atmospheric high temperature treatment at 390°C. As a result of the pressure treatment, cracking of heavy molecules, including heavy resin and some portion of asphaltene, is initiated. The properties of the impregnation pitch are then decided by the following high temperature treatment; the low softening point, high coking value and product yield relative to the control (a high temperature treatment). As results, the impregnation pitches with the properties comparable with the commercial ones were successfully synthesized. We also observed that the quinolone insoluble components of the pitches can be used as a criterion for mobility and carbonization yield during the impregnation and re-carbonization steps.