

## Promoting homogeneous stabilization of coal tar pitch through Friedel-Crafts crosslinking reaction

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**Abstract:** Stabilization is of important for maintaining specific morphology of pitch-based carbon products as well as strengthening their mechanical performances. However, it is challenging to achieve a reduced stabilization process period while maintaining a homogeneous stabilization up to now. The balance of the plastically and stabilization reactivity of the constituent molecules of pitch is also still a matter of much concern. Herein, a novel enhanced stabilization of coal tar pitch is reported using chloroform as modifier through the Friedel-Crafts crosslinking reaction. The results suggest that introduced C-Cl bonds decompose at temperature above 200°C to form more reactive sites, which evenly promote molecular cross-linkage in modified CTP. These crosslinking molecules will further break and repolymerize at higher temperatures, promoting condensation of the pitch molecules. Especially in air atmosphere, such promotion effect is more obvious, reflected in significantly reduce the stabilization period and end-use temperature. Notably, tailor-made C-Cl bond in modified pitch ensures both low softening point and high crosslinking reactivity, referring an excellent machining performance. This work has realized the homogeneously rapid stabilization of pitch at the molecular level, which provides a strong guarantee for the production of pitch-based carbon products at low cost.