Accepted Manuscript

High char yield novolac modified by Si-B-N-C precursor: Thermal stability and structural evolution

Yi Wang, Lixin Chen, Tingting Xu, Yi Yan, Junwei Gu, Jin Yun, Junjun Feng

PII: S0141-3910(17)30020-4

DOI: 10.1016/j.polymdegradstab.2017.01.013

Reference: PDST 8152

To appear in: *Polymer Degradation and Stability*

Received Date: 7 October 2016

Revised Date: 27 December 2016

Accepted Date: 21 January 2017

Please cite this article as: Wang Y, Chen L, Xu T, Yan Y, Gu J, Yun J, Feng J, High char yield novolac modified by Si-B-N-C precursor: Thermal stability and structural evolution, *Polymer Degradation and Stability* (2017), doi: 10.1016/j.polymdegradstab.2017.01.013.

High char yield novolac modified by Si-B-N-C precursor: thermal stability and structural evolution

Yi Wang, Lixin Chen*, Tingting Xu, Yi Yan, Junwei Gu, Jin Yun, Junjun Feng

Department of Applied Chemistry, School of Science, Northwestern Polytechnical University, Xi'an 710072, China

* Correspondence: lixin@nwpu.edu.cn; Tel.: +86-029-88431688

Abstract: In this contribution, novolac modified by CSEB ceramic precursor (B,B,B-tris[(chlorodimethylsilyl)-ethane]borazine , CSEB) was synthesized successfully. The corresponding molecular structure, chemical state and thermal property were characterized by FT-IR, Raman spectra, XPS, NMR and TGA. Meanwhile, DTA/TG/MS test was also performed to track the weight loss and gas evolution of modified novolac during the thermal degradation. CSEB could obviously improve the thermal decomposition temperature and the char yield of novolac. The maximum decomposition rate temperature is increased up to 575.2^{o}C. The char yield is increased to 75.5% at 800^{o}C, 72.6% at 1000^{o}C and 68.7% at 1200^{o}C, respectively. The improvement of the thermal stability of modified novolac could be mainly attributed to the incorporation of six-membered borazine ring (B_3N_3), elements of Si, B and N. The B_3N_3 ring remains stable at 1400^{o}C. And fixed structure Si-O_x was formed during heat treatment. Moreover, CSEB also promote the graphitization.