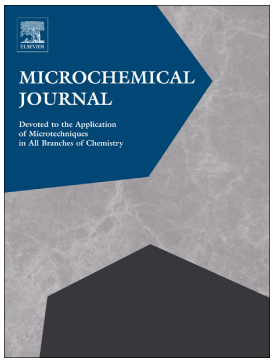
Accepted Manuscript



Study on dispersibility of thermally stable carbon black particles in ink using asymmetric flow field-flow fractionation (AsFlFFF)

Woonjung Kim, Jihyun Bae, Chul Hun Eum, Jongjin Jung, Seungho Lee

PII: S0026-265X(18)30426-0
DOI: doi:10.1016/j.microc.2018.06.035
Reference: MICROC 3235

To appear in: *Microchemical Journal*

Received date: 7 April 2018
Revised date: 23 June 2018
Accepted date: 23 June 2018

Please cite this article as: Woonjung Kim, Jihyun Bae, Chul Hun Eum, Jongjin Jung, Seungho Lee , Study on dispersibility of thermally stable carbon black particles in ink using asymmetric flow field-flow fractionation (AsFlFFF). Microc (2018), doi:10.1016/j.microc.2018.06.035

Study on dispersibility of thermally stable carbon black particles in ink using asymmetric flow field-flow fractionation (AsFlFFF)

Woonjung Kim[a], Jihyun Bae[a], Chul Hun Eum[b], Jongjin Jung[a], Seungho Lee[a,★]

[a]*Department of Chemistry, Hannam University, 305-811, Daejeon, Korea Republic*

[b]*Geoscience Analysis Center, Korea Institute of Geoscience and Mineral Resources, Daejeon, 34132, Korea*

[*]To whom correspondence should be addressed (e-mail: slee@hnu.kr; telelphone +82-42-629-8822; fax +82-42-629-8811)

Abstract

Carbon black (CB) has excellent chemical and physical properties including strong chemical strength and electrical conductivity. CB is widely used in various industries such as semiconductor, tire, rubber, ink, paint, toner and resin. When used in ink, as the CB particle size and the size distribution become smaller and narrower, respectively, they tend to be better dispersed, and the glossiness and stability of the ink increases.

In the present study, asymmetrical flow field-flow fractionation (AsFlFFF) was employed to analyze the size distribution of CB particles used in ink. CB suspensions were prepared by dispersing CB powder in aqueous media containing copolymeric dispersing agents of hydrophobic (styrene) and hydrophilic (acrylic or maleic acid) monomers. Experimental parameters of AsFlFFF were optimized for analysis of the CB particles.

Although the mean sizes obtained by AsFlFFF and dynamic light scattering (DLS) were in good agreements for those with narrow size distributions, DLS failed to distinguish among the CB suspensions having broad size distributions, whereas AsFlFFF differentiated them easily. Results indicated that the CB particles were dispersed better with copolymeric dispersing agents having an aromatic polymer with OH functionality than those with COOH functionality. It was also observed that, as the mean size of the CB particles decreases and the size distribution becomes narrower, the ink become thermally more stable.

KEYWORDS: Carbon black (CB) suspension; surface treatment; Asymmetric flow field-flow fractionation (AsFlFFF); particle size distribution; Thermal stability