Characteristics of Tire Wear Particles Generated in a Laboratory Simulation of Tire/road Contact Conditions

Inyong Park, Hongsuk Kim, Seokhwan Lee

www.elsevier.com/locate/jaerosci

PII: S0021-8502(18)30164-2
DOI: https://doi.org/10.1016/j.jaerosci.2018.07.005
Reference: AS5316

To appear in: *Journal of Aerosol Science*

Received date: 25 April 2018
Revised date: 27 June 2018
Accepted date: 16 July 2018

Cite this article as: Inyong Park, Hongsuk Kim and Seokhwan Lee, Characteristics of Tire Wear Particles Generated in a Laboratory Simulation of Tire/road Contact Conditions, *Journal of Aerosol Science,* https://doi.org/10.1016/j.jaerosci.2018.07.005

Characteristics of Tire Wear Particles Generated in a Laboratory Simulation of Tire/road Contact Conditions

Inyong Park, Hongsuk Kim, Seokhwan Lee*

Department of Engine Research, Korea Institute of Machinery and Materials, 156 Gajeongbuk-ro, Yuseong-gu, Daejeon, 34103, Republic of Korea

*Corresponding author. shlee@kimm.re.kr

Abstract

An experimental study of the non-exhaust emission characteristics of tire wear particulate matter (PM) was performed using a tire wear simulator. Building upon previous studies of PM emissions from non-exhaust sources, the total amount of tire wear particles (TWPs) was measured and their morphological and elemental characteristics were investigated. The peak size of TWPs generated at a constant speed of 80 km/h was around 2 μm. Under harsh friction conditions, the mean diameter increased and the size distribution broadened. In addition, the number concentration of ultrafine particles increased significantly. Based on morphological study, we divided TWPs into five categories: sausage-like particles, micron-sized spherical particles, torn debris, ultrafine particles, and aggregates of ultrafine particles. The results of energy dispersive spectroscopy analysis showed that ultrafine particles from tire tread were composed of carbon, silica, and sulfur.