Particle characterization for the development of a brake wear particle collection system

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As exhaust pollutant reduction technology progresses with the reinforcement of automobile exhaust emission regulations, and the adoption of eco-friendly vehicles, such as electric and hydrogen cars, increases, the generation of particulate matter from exhaust systems is consistently decreasing. Nevertheless, there has been limited progress in the development of technology to reduce particulate matter generated from non-exhaust systems, such as tyre or brake wear. With the earnest implementation of Euro-7 regulations, aimed at regulating particulate matter from non-exhaust systems, significant efforts are required to mitigate non-exhaust emissions resulting from tyre and brake wear.

In this study, the characteristics of brake wear particles were analyzed to develop an effective method for collecting brake wear particles. In particular, the charge characteristics of particles were studied to develop a novel fine dust collection system that can replace filter-type dust collectors. Furthermore, we designed a dust collection system that can effectively capture brake wear particles using electrostatic force. When evaluating the performance of the developed dust collection system on the brake dynamometer, it was confirmed that approximately 78% of generated wear particles could be collected under WLTC cycle driving conditions.

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