

Design and Fabrication of Thermophoretic Soot Sampling Device

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Abstract

To reduce soot emission from diesel engine combustion, an improved understanding related to its formation process is important. The soot morphology and emission can be investigate using different methods. One of the most common methods is to collect the soot samples using thermophoretic sampling device (TSD) and use microscopic method to study soot morphology and microstructure. In this project, a thermophoretic sampling device has been designed and fabricated. For results, a theoretical calculation and simulation was conducted to find the extension and retraction speed of the selected. The cylinder extension speed for fabricated TSD is 72.3 mm/s while retraction speed is 62.2 mm/s. Then, this TSD was used to collect the soot samples from engine exhaust tail pipe. Finally, the soot samples were analysed by SEM (scanning electron microscope) method. The collected soot samples shoed chain like structure of the soot agglomerates. In addition, the size of the agglomerates was in the range of 100 nm to 1000 nm. The results of SEM analysis revealed capability of fabricated TSD to collect appropriate sample for soot emission microscopic analysis.

Keywords: Soot; Diesel; Engine; Sampling; SEM; Microstructure.