

Euro IV Diesel Engine Soot: Microstructure and Oxidation Behaviour

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The current discussion in the European Union about small particles from diesel engine exhaust gas shows again how our society is becoming sensitive to the general issue of air pollution and is concerned about the increasing number of passenger cars and trucks in urban area and by the corresponding health risk for human being. Decreasing the emission rate of exhaust gases of diesel engines (or the mass of the emitted particulates) has been the aim of both the legislature and the automobile industry. The effort has been made in two directions: the optimisation of the combustion process of fuel in engines and the development of techniques for the after-treatment of particulates, for instance, the filtering technique. The implementation of the EURO IV Standard in the European Union in 2004 is a consequence of the pressure from the society, population and political groups on the legislative organ and industry.

Recently, we studied intensively the microstructure and oxidation behaviour of an Euro IV heavy duty diesel engine [1-4]. We found, surprisingly, that the measures taken in order to decrease soot emission also change the microstructure and chemical reactivity of the emitted particulates. These soot particulates consist of fullerenic primary particles. They are very small, exhibit highly defective structure and are highly functionalised. This indicates a change in the soot formation mechanism under low-emission conditions. We found that a reduction of the emission rate of soot particles is not automatically beneficial for environment protection and for reducing the epidemiological effects on human health. Instead, the soot becomes chemically similar to biomolecules which results in facile interfacing between the inorganic material and the biosphere [4]

Reference:

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[3] J.-O. Müller, D.S. Su, R. Fentoft, J. Kröhnert, F. Jentoft, R. Schlögl, *Catalysis Today* in press

[4] D. S Su, J.-O. Müller, D. Rothe, R.E. Jentoft, B. Jacob, R. Schlögl, to be published