

# **Raman spectroscopy of soot with various fractions of organic compounds: structural characterization during heating treatment from 25 °C to 1000 °C**

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## **Abstract**

Soot particles undergo considerable changes in composition, morphology, as well as in internal structure during formation from the incipient particles to more mature aggregates, and still there is a lack of understanding of these mechanisms. In this study, soot produced by a mini-CAST soot generator was probed using Raman spectroscopy with focus on soot with different maturity and large variation in the fraction of organic compounds. The volatility of organic compounds and changes in internal bonding structures of the soot was surveyed by heating the samples from room temperature up to 1000 °C in a flow of inert N<sub>2</sub> gas. The soot rich in organics showed more complex Raman spectra and stronger photoluminescence background. In particular, Raman signatures interpreted as the C-H “out-of-plane” mode, ethers C-O-C and carbonyl C=O groups were observed. During the heating treatment, these signatures disappeared, which was related to the vaporization of the organics. Moreover, an enhancement of Raman band intensity of mature soot during heating treatment was observed for the first time. Our study thus brings new information on structural and compositional changes for soot during heating treatment in an inert atmosphere.