

Supplemental material

Observation of structural changes during oxidation of black and brown soot using Raman spectroscopy

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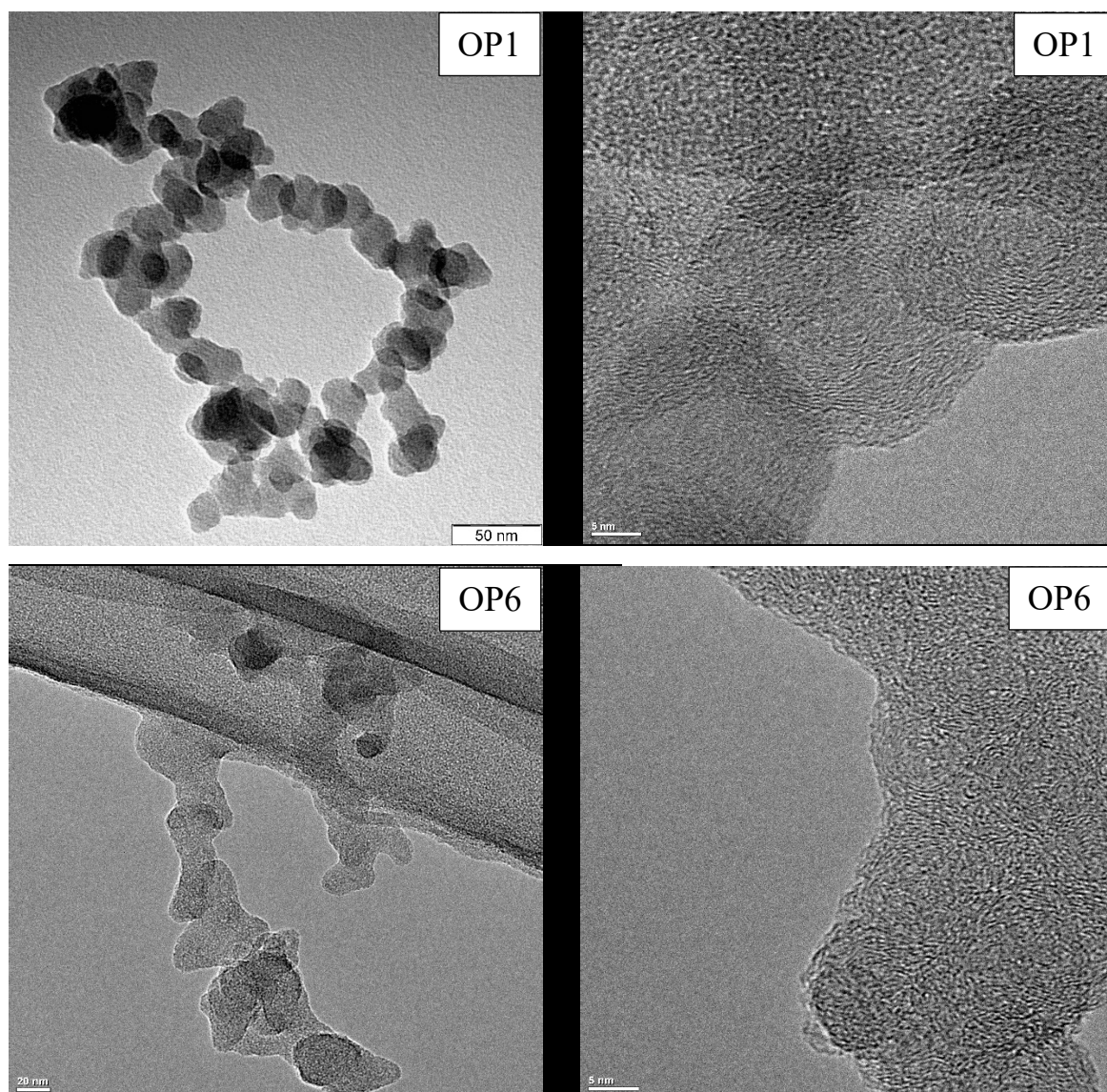


Figure S1: High resolution transmission electron microscopy images of OP1 soot and OP6 soot

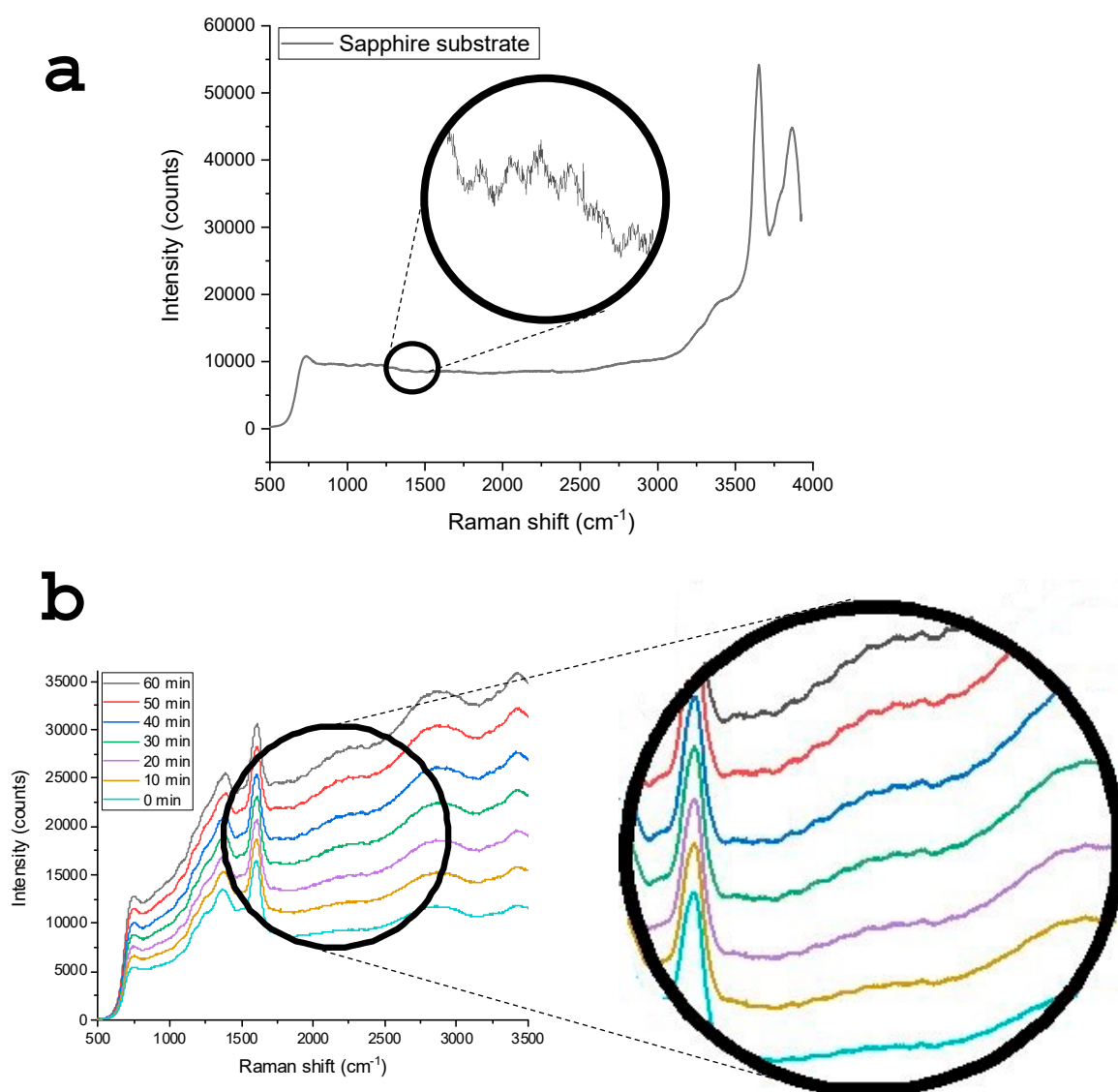


Figure S2: Fringes appear in spectrum of the clean sapphire substrate (a) and in those of OP6 soot exposed to laser radiation at different time length (b)

Note 1: Subtracting photoluminescence signal from the soot spectra

In Fig. S2, we observe interference between the incident light and the scattered light on the substrate, resulting in a sinusoidal function in the spectra of both the clean substrate and OP6 soot. The amplitude of this function increases with the background intensity, as depicted in Fig. S2b. Consequently, using a straight line or second polynomial function alone cannot effectively subtract this interference. As a consequence of this interference, we are unable to clearly observe variations in the D₃ band and may misinterpret an increase of oxygenated groups and shoulder peaks of the D and G bands. Fig. S3 presents a comparison of three different background subtraction methods: the straight line, the second polynomial function, and the signal from organic compounds.

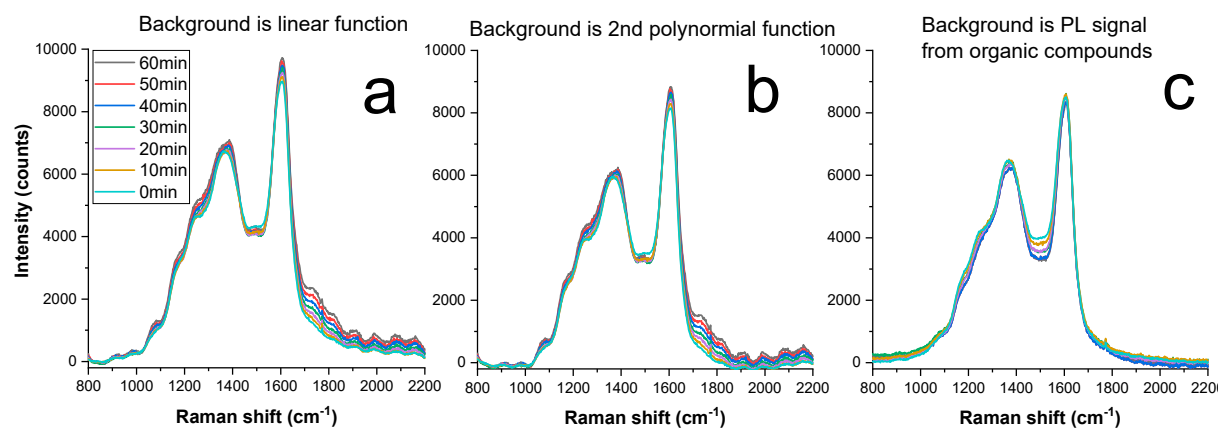


Figure S3: Comparing Raman spectra of OP6 soot exposed to laser irradiation after subtracting background as a straight line (a), a 2nd polynomial curve (b), and the signal from organic compounds (c).

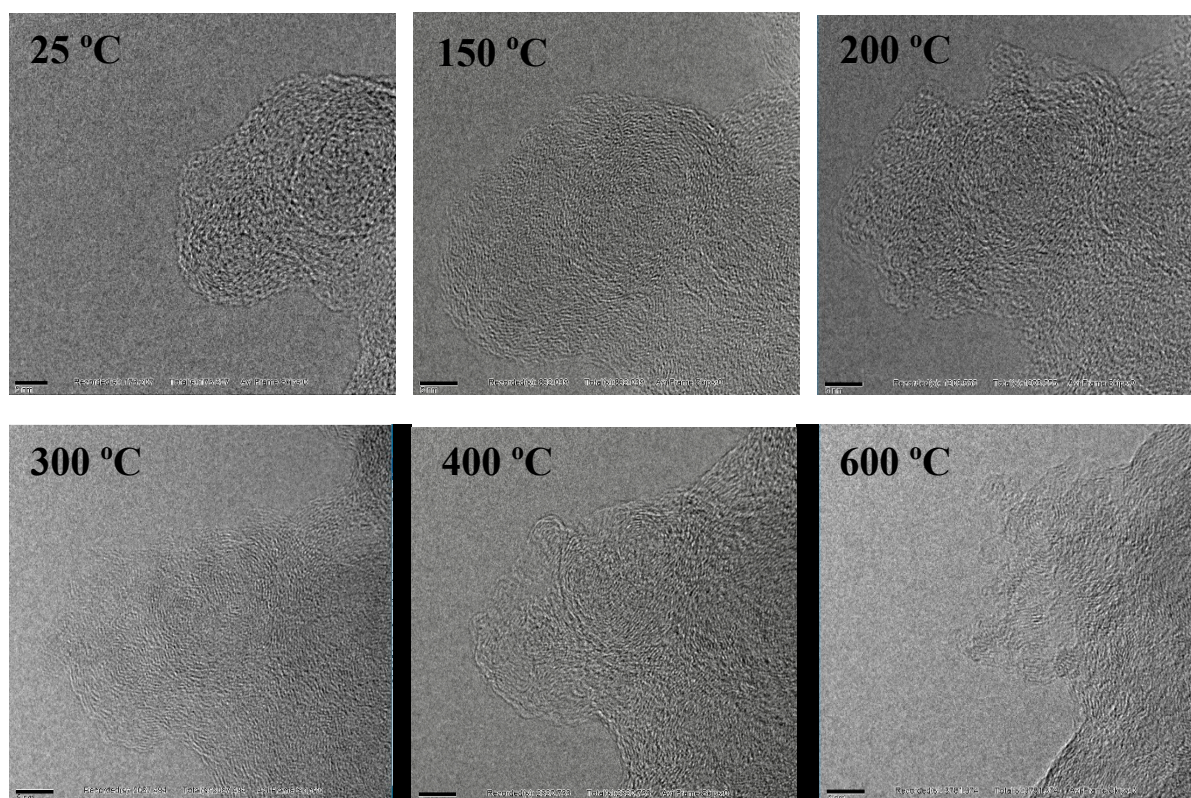


Figure S4: The structural evolution of OP1 soot observed via high resolution transmission electron microscopy