

Supplementary Material

Blue micro-nanoplastics abundance in the environment: a double threat as Trojan Horse of plastic-Cu-phthalocyanine pigment and an opportunity for nanoplastic detection via micro-Raman spectroscopy

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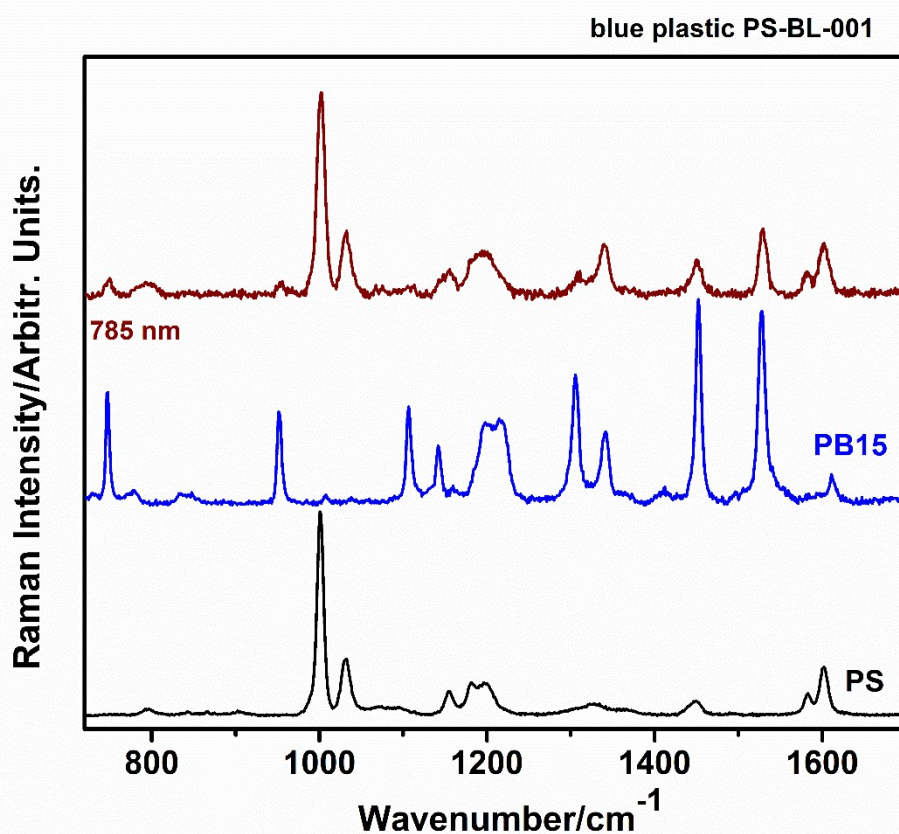


Figure S1. Normalized Raman spectra of a blue polystyrene macroplastic (PS-BL-001) at 785 nm excitation (dark red line); with blue line is the specific Raman spectrum of PB15 pigment (excitation: 632.8 nm) and with black line is the reference spectra of polystyrene (excitation: 785 nm).

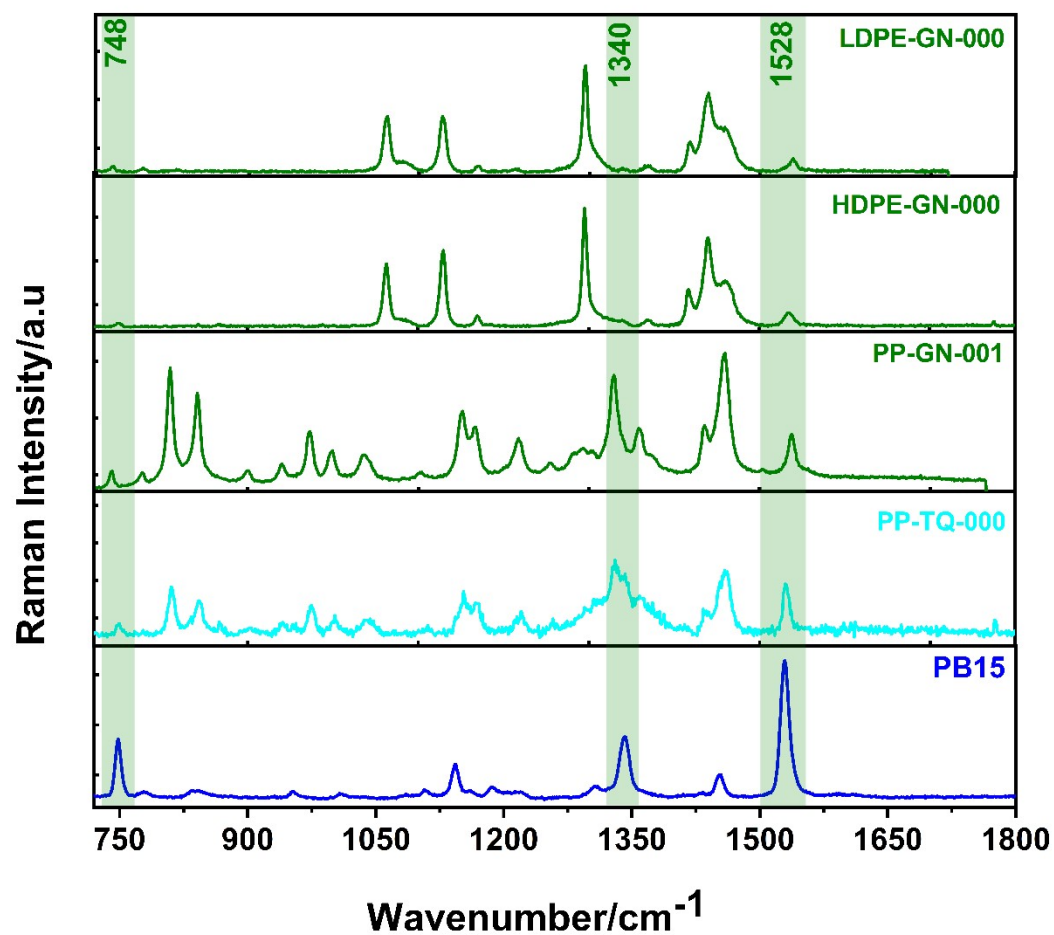


Figure S2. The Raman spectra of the green and one cyan macroplastics, encompassing three types of plastics: LDPE, HDPE, and PP; the bottom spectrum in blue is corresponding to PB15 pigment. Excitation: 785 nm.

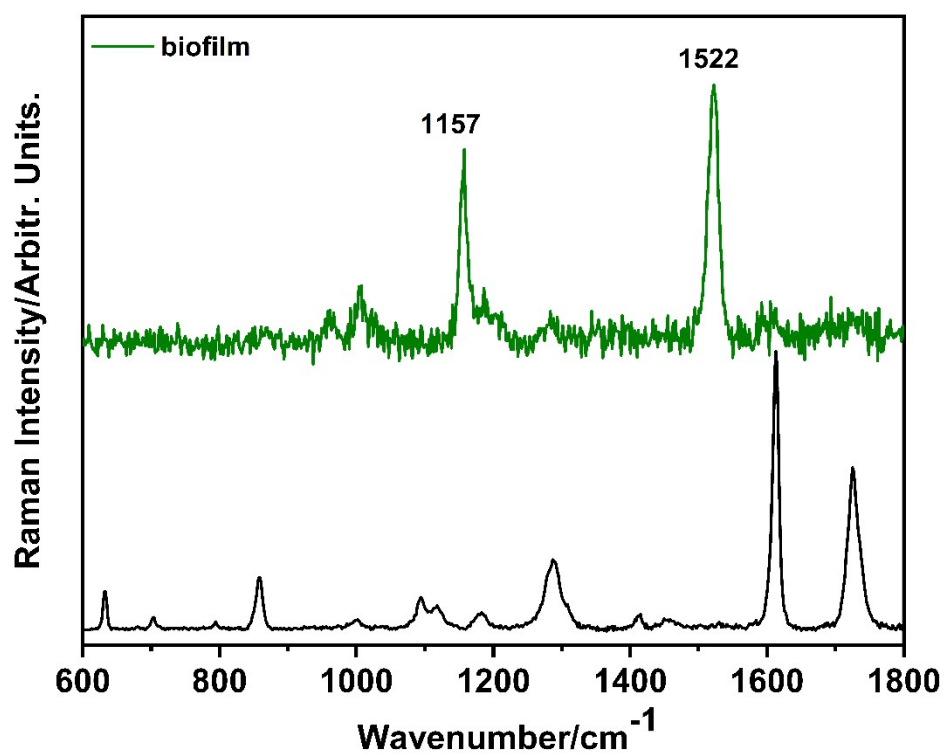


Figure S3. The Raman spectra of polyethylene terephthalate (PET) bottle (black line) and biofilm (green line) formed on the inner surface of the PET (excitation: 532 nm).

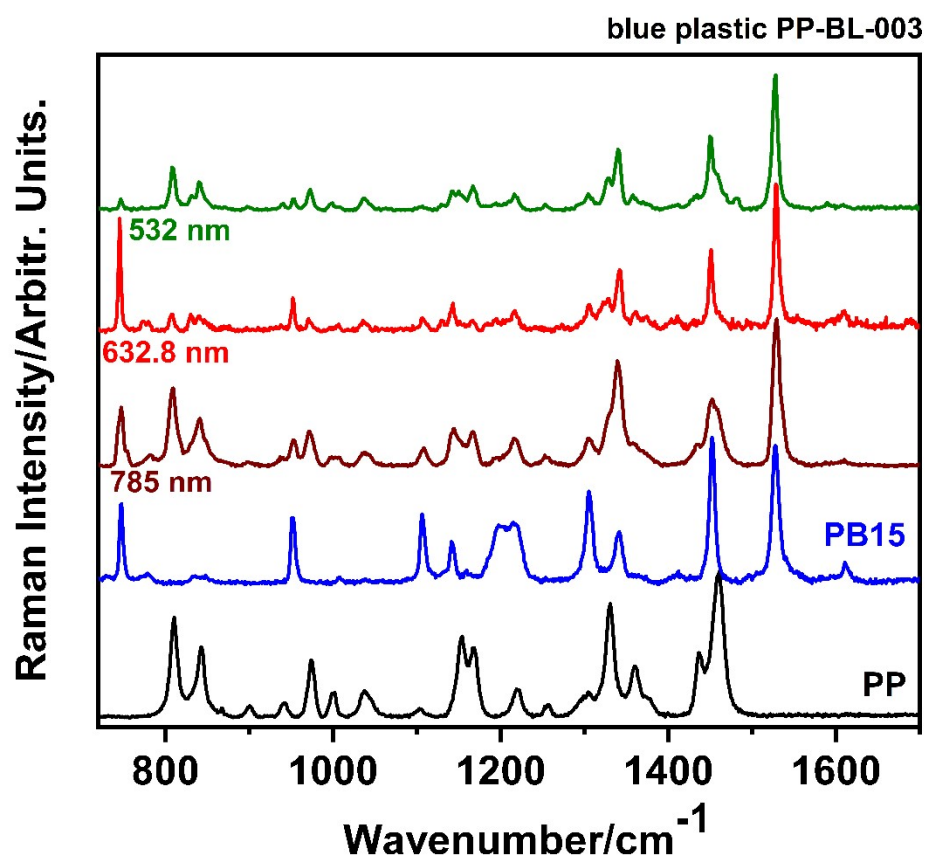


Figure S4. Normalized Raman spectra of PP-BL-003 sample at three excitation lines, 532 nm (green line), 632.8 nm (red line), and 785 nm (dark red line); with blue line is the specific Raman spectrum of PB15 pigment (excitation: 632.8 nm) and with black line is the reference spectrum of polypropylene (excitation: 785 nm).

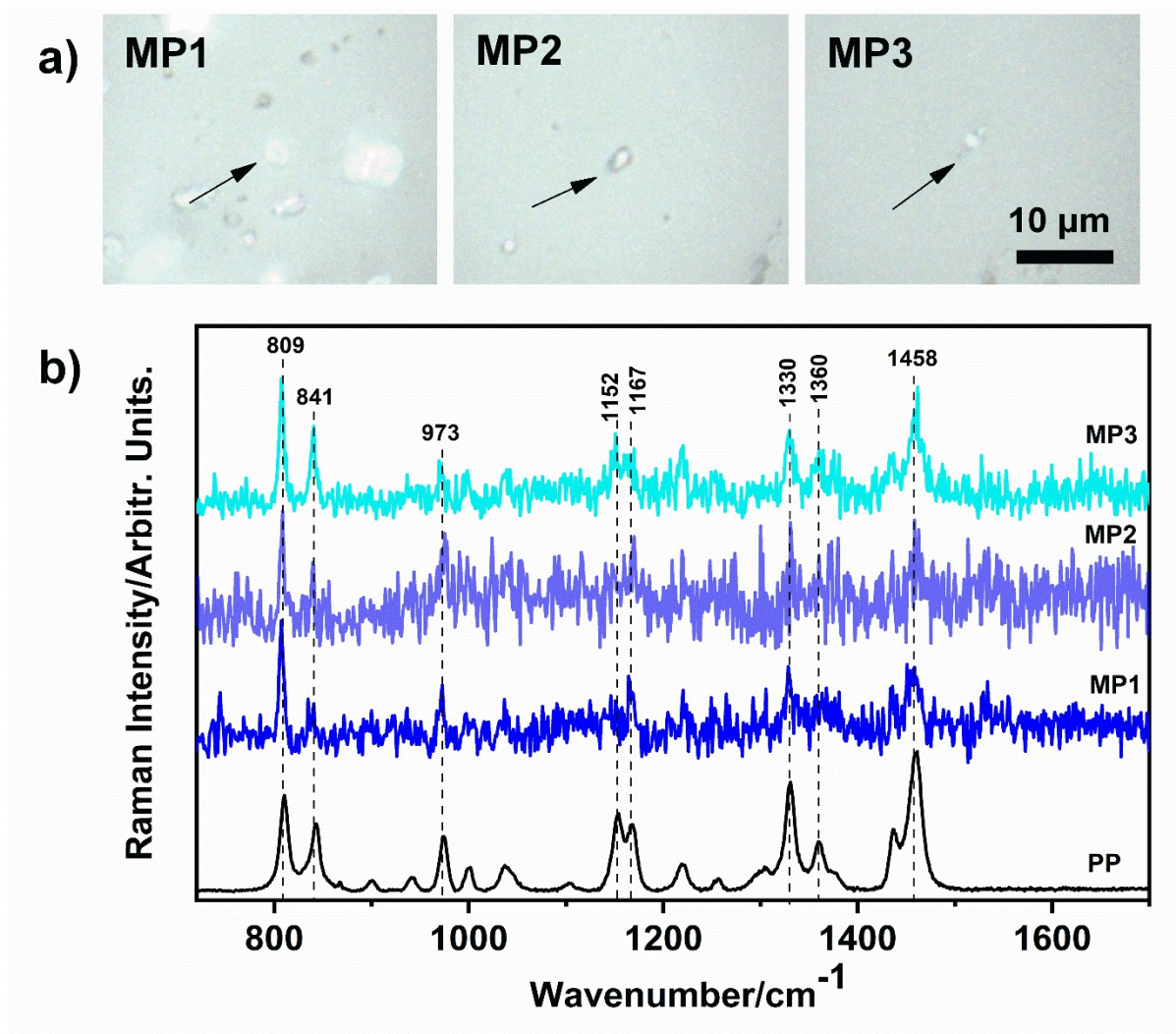


Figure S5. a) the optical microscopy images of three blue microplastics, MP1, MP2 and MP3 (excitation: 632.8 nm) and b) their corresponding Raman spectra; with black line is the Raman spectrum of polypropylene for reference (excitation: 785 nm).

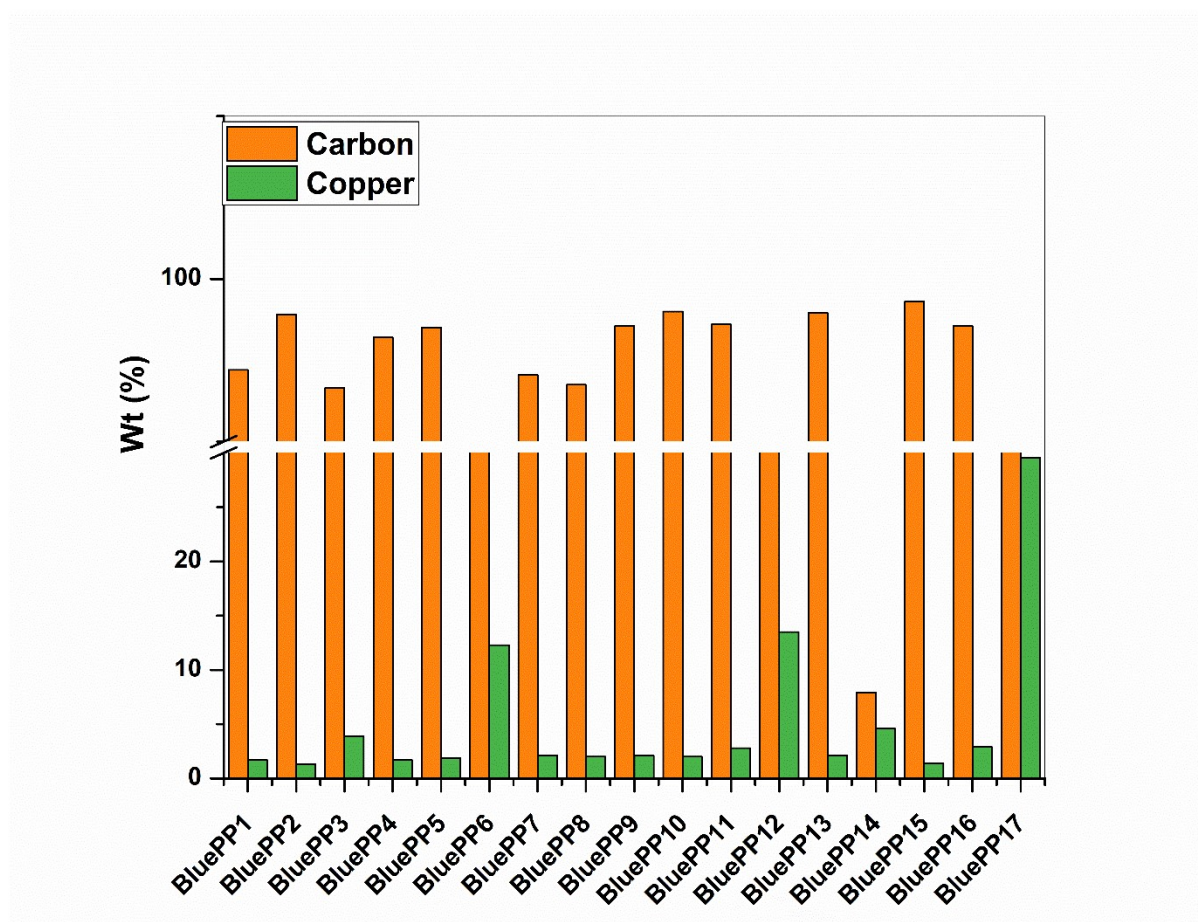


Figure S6. Ratio of carbon to copper content for 17 blue micro-nanoplastics analyzed by SEM-EDX.

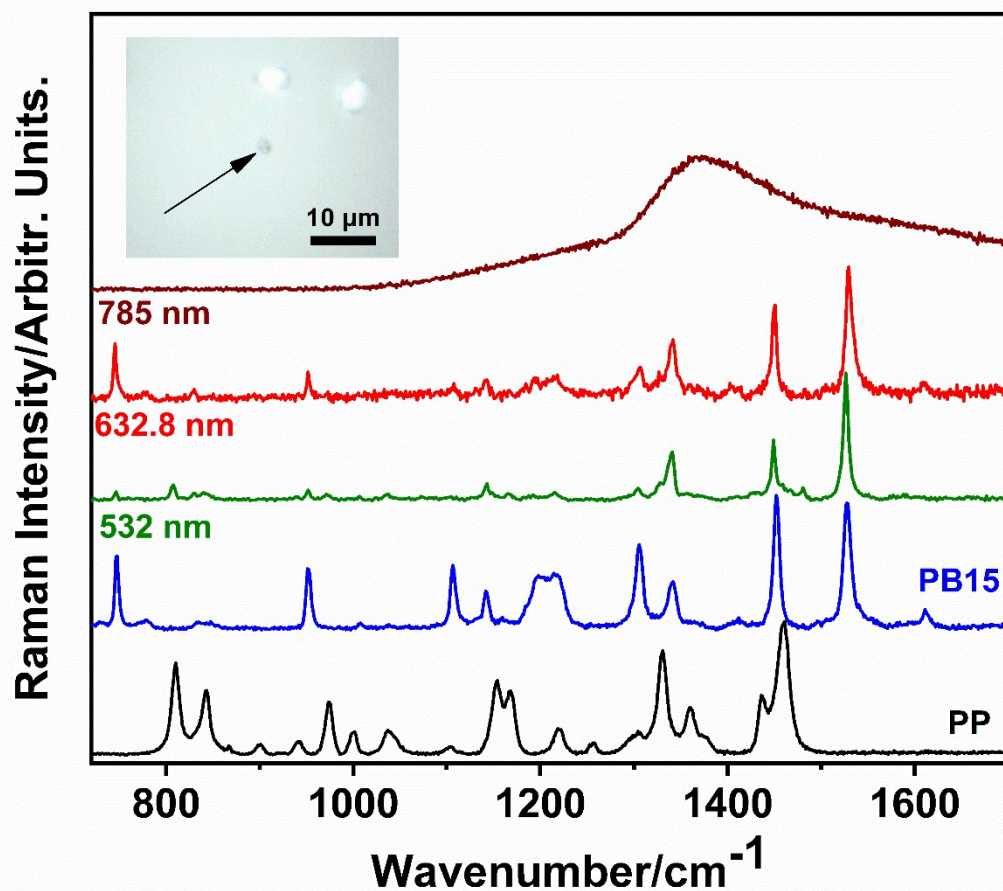


Figure S7. Normalized Raman spectra of a blue particle (inset image) of 1 μm at three excitation lines, 785 nm (dark red line), 632.8 nm (red line), and 532 nm (green line); with blue line is the specific Raman spectra of PB15 pigment (excitation: 632.8 nm) and with black line is the corresponding reference spectrum of polypropylene (excitation: 785 nm).