

Figure S1. Signal coverage (%) calculated by applying a SNR mask superior to 4 for each exposure conditions (Top, Bottom, and Control) and substrata (OS, P-MRS, and S-MRS). Histogram shows no significant statistical difference between Top, Bottom and Control, that means no significant difference either between simulated space exposure and Mars-like conditions on spectra.

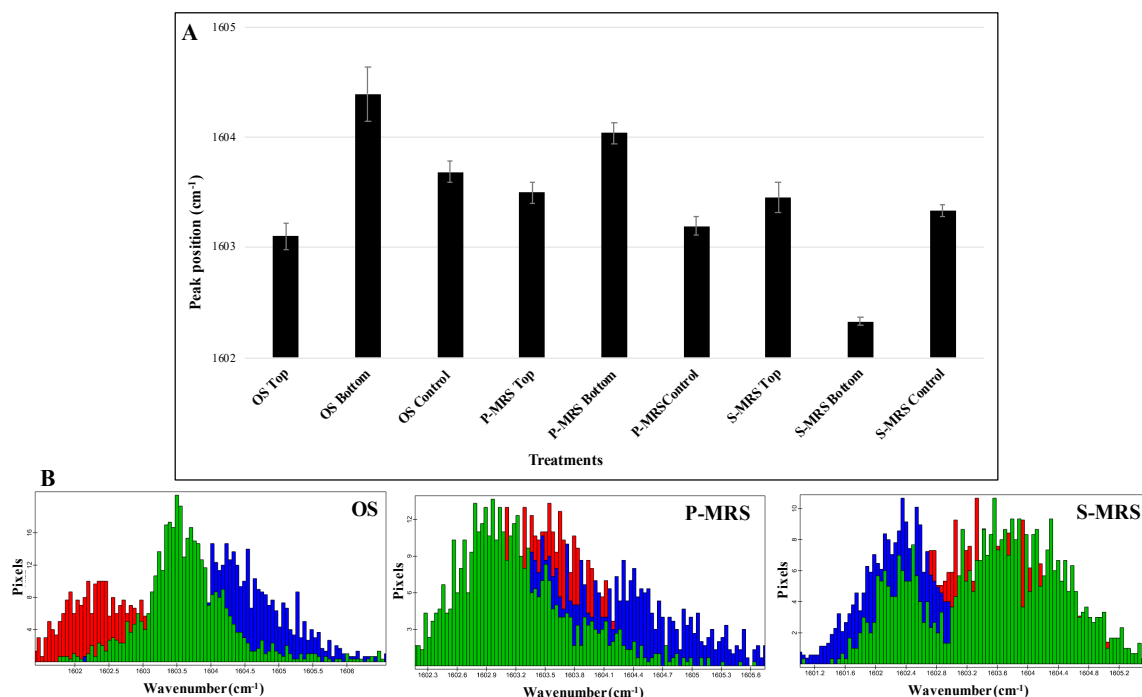


Figure S2. Confocal Raman Spectroscopy. **A)** Peak position for each exposure conditions (Top, Bottom, and Control) and substrata (Original Substrate: OS, Phyllosilatic Mars Regolith Simulant: P-MRS, and Sulfatic Mars Regolith Simulant: S-MRS). Histogram shows no significant statistical difference between Top, Bottom and Control, that means no significant difference either between simulated space exposure and Mars-like conditions on melanin peaks. **B)** Distribution of the 1604 cm⁻¹ melanin peak position is shown on the histogram for Top (red), Bottom (blue), and Control (green) for OS, P-MRS, and S-MRS samples.