



S5 Fig. Representative Raman microspectroscopic spectra (*left*) and their corresponding Raman images based on integrated intensities in the range of 100-700 cm⁻¹ (*right*), observed for 4.5% SiO₂NPs-embedded polyester composite coatings before and after 3 years of environmental exposure in sub-tropical and tropical climates (from *top* to *bottom*). Note that the representative Raman spectra were extracted from the locations indicated by arrows on the corresponding images.