

Surface modification of plastics via direct fluorination to promote the staining with methylene blue

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ABSTRACT

The surface of polycarbonate (PC) was modified with fluorine gas at 25 °C and 10-380 Torr for 1 h. The surface roughness of the fluorinated PC samples was approximately five times larger than that (1.2 nm) of the untreated thing. The results of Fourier transform infrared spectroscopy and X-ray photoelectron spectroscopy showed that the bonds (e.g., -C=O and C-Hx) derived from raw PC decreased and were converted into fluorinated bonds (e.g., -CFx) after surface fluorination. These fluorinated bonds showed higher electronegativity according to the zeta potential results. Fluorinated PC could be stained with the methylene blue basic dye because of the increased surface roughness and the negatively charged surface. Polyethylene terephthalate was also analyzed and stained.

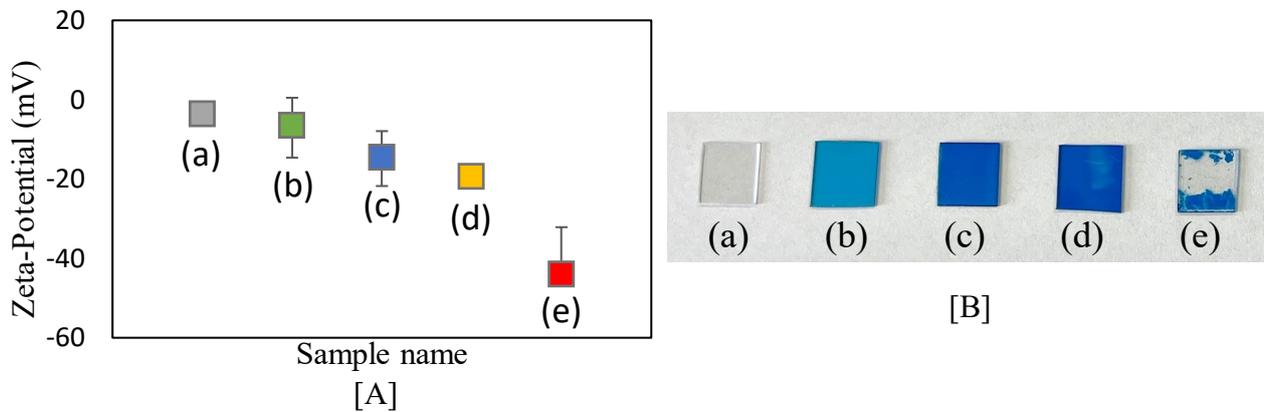


Fig. 1 Zeta potential [A] and staining results with methylene blue [B] of PC samples. [(a):untreated samples, (b):samples fluorinated with F₂ gas 10torr, (c):samples fluorinated with F₂ gas 50torr, (d):samples fluorinated with F₂ gas 100torr, (e):samples fluorinated with F₂ gas 380torr]

REFERENCES

J.H. Kim, T. Mishina, F. Nishimura, S. Yonezawa (2021), "Effects of surface fluorination on the dyeing of polycarbonate (PC) resin", *Journal of Coatings Technology and Research*, **19**, 617-624.

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