

Supplementary materials for
Phase-separated structure of NBR/PVC blends with
different acrylonitrile contents investigated using
STEM-EDS mapping analysis

Yuka Komori*^{1, 2} • Aoi Taniguchi² • Haruhisa Shibata¹ •
Shinya Goto¹ • Hiromu Saito²

¹Materials Engineering R&D Division, DENSO
CORPORATION, Kariya-shi 448-8661, Aichi, Japan

²Department of Organic and Polymer Materials
Chemistry, Tokyo University of Agriculture and
Technology, Koganei-shi 184-8588, Tokyo, Japan

Ec and *V* of the constituents of NBR and PVC

group	cohesive energy E_C (J/mol)	molar volume V (cm ³ /mol)
CH ₂	4940	16.1
CH	3430	−1.0
− CH =	4310	13.5
CN	25530	24.0
Cl	11550	24.0

Acrylonitrile part of NBR

$$E_C = 4940 + 3430 + 25530 = 33900$$

$$V = 16.1 + (-1.0) + 24.0 = 39.1$$

Butadiene part of NBR

$$E_C = 4940 + 4940 + 4310 + 4310 = 18500$$

$$V = 16.1 + 16.1 + 13.5 + 13.5 = 59.2$$

NBR-L (AN content: 18.0 wt%)

$$E_C = 33900 \times 0.18 + 18500 \times 0.82 = 21272$$

$$V = 39.1 \times 0.18 + 59.2 \times 0.82 = 55.582$$

$$\delta_{\text{NBR-L}} = (E_C/V)^{0.5} = 19.6$$

NBR-M (AN content: 29.0 wt%)

$$E_C = 33900 \times 0.29 + 18500 \times 0.71 = 22966$$

$$V = 39.1 \times 0.29 + 59.2 \times 0.71 = 53.371$$

$$\delta_{\text{NBR-M}} = (E_C/V)^{0.5} = 20.7$$

NBR-H (AN content: 33.5 wt%)

$$E_C = 33900 \times 0.335 + 18500 \times 0.665 = 23659$$

$$V = 39.1 \times 0.335 + 59.2 \times 0.665 = 52.4665$$

$$\delta_{\text{NBR-H}} = (E_C/V)^{0.5} = 21.2$$

PVC

$$E_C = 4940 + 3430 + 11550 = 19920$$

$$V = 16.1 + (-1.0) + 24.0 = 39.1$$

$$\delta_{\text{PVC}} = (E_C/V)^{0.5} = 22.6$$

Figure S1. *Ec* and *V* of the constituents of NBR and PVC, and the calculated procedure of the solubility parameter.

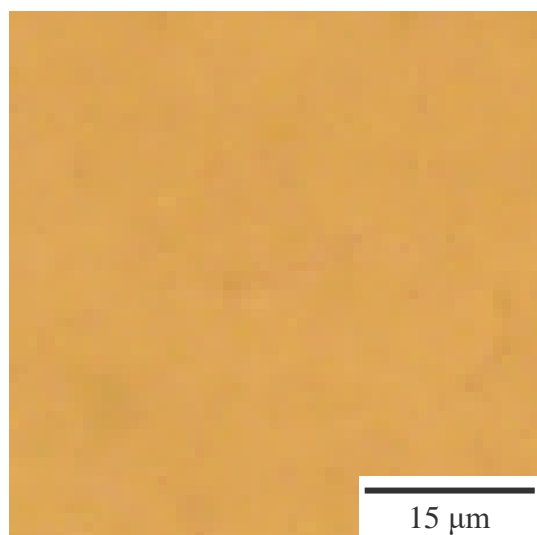
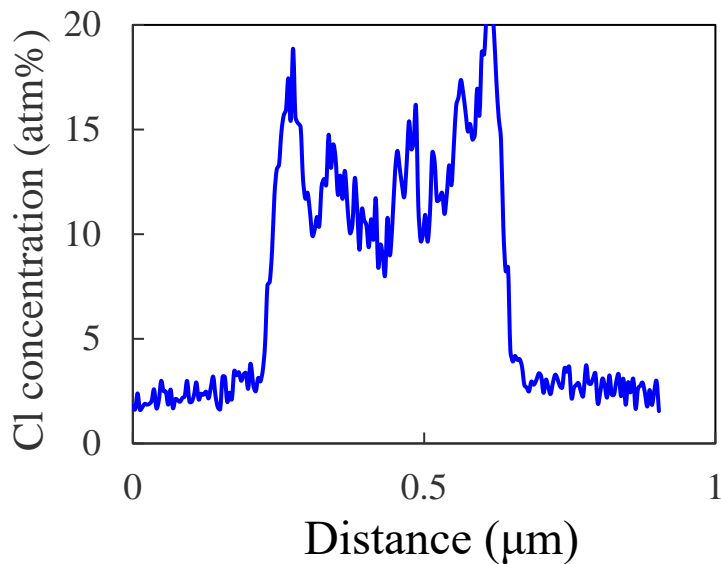
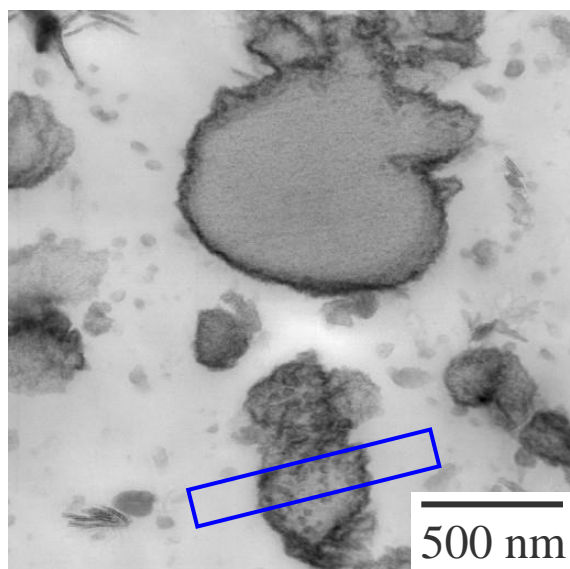
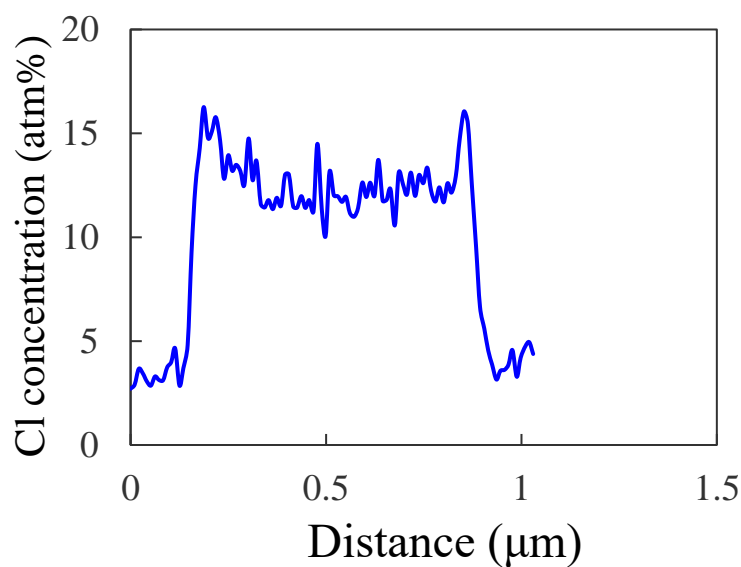
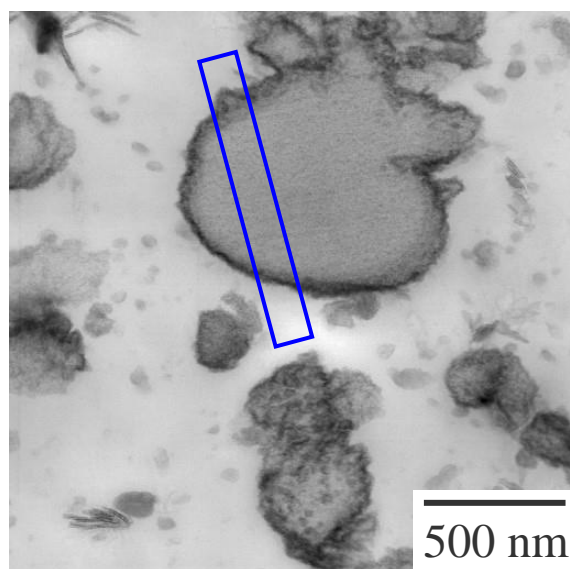


Figure S2. Optical micrograph of the 60/40 NBR-L/PVC, in which PVC domains with a diameter about 1 μm dispersed in the NBR matrix were observed via the STEM images shown in Figure 3a.

(a)



(b)



(c)

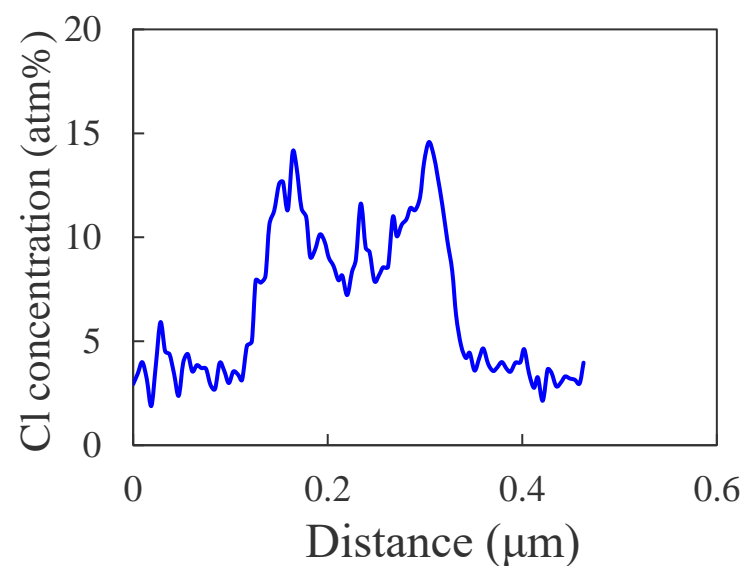
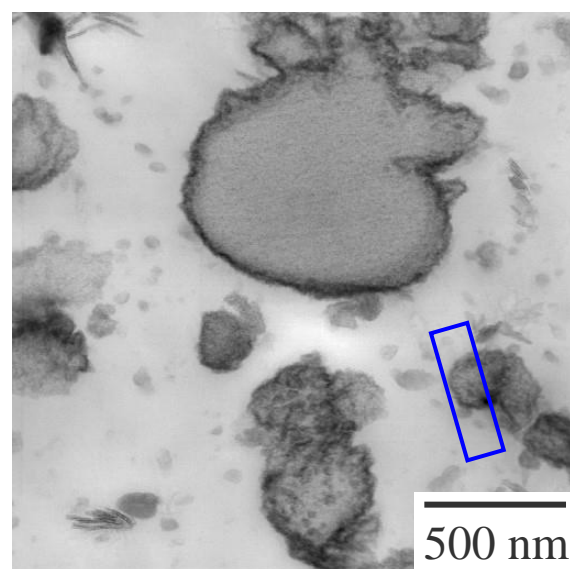


Figure S3. Concentration distribution of chlorine for the 60/40 NBR-L/PVC at different areas.

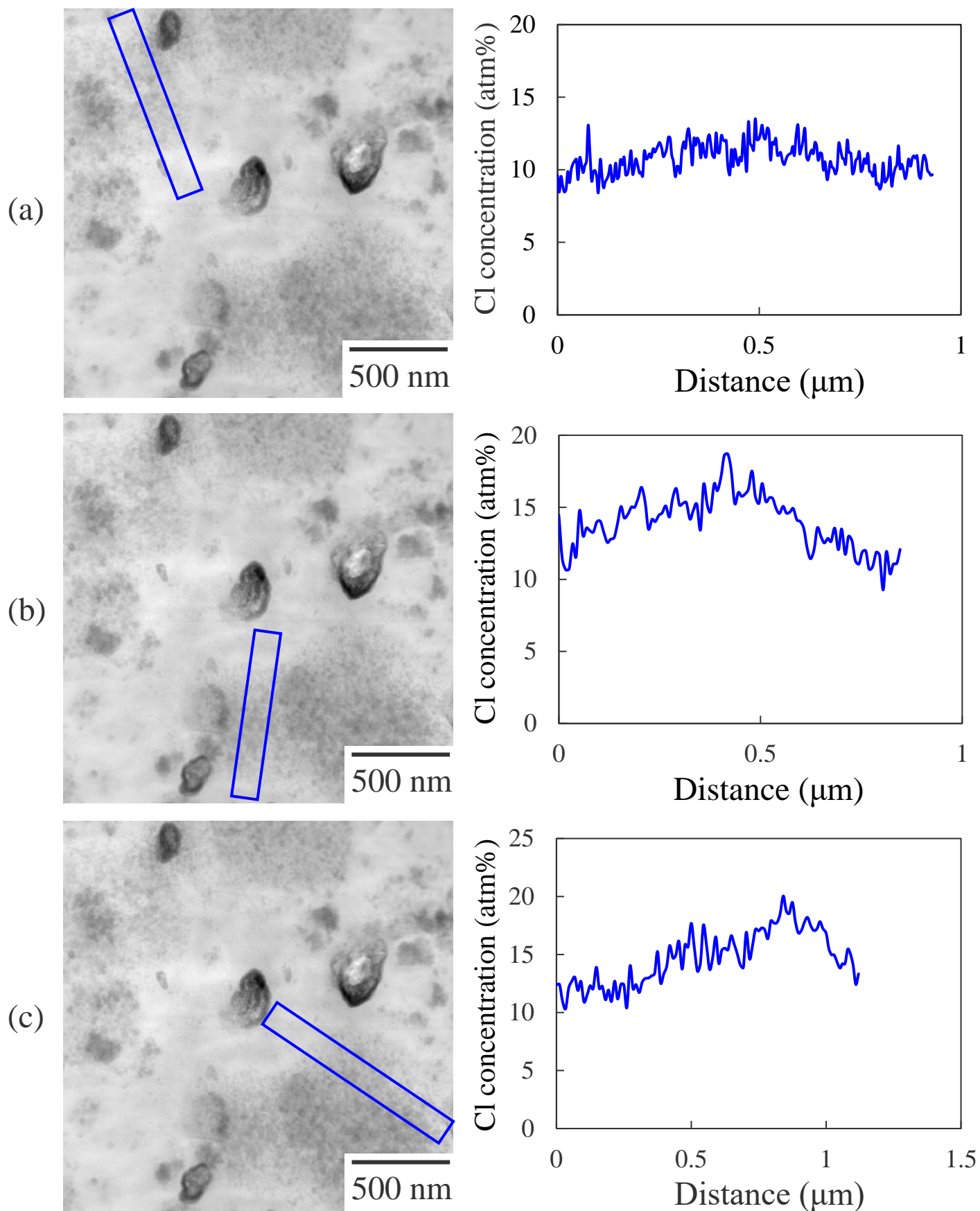


Figure S4. Concentration distribution of chlorine for the 60/40 NBR-M/PVC at different areas.

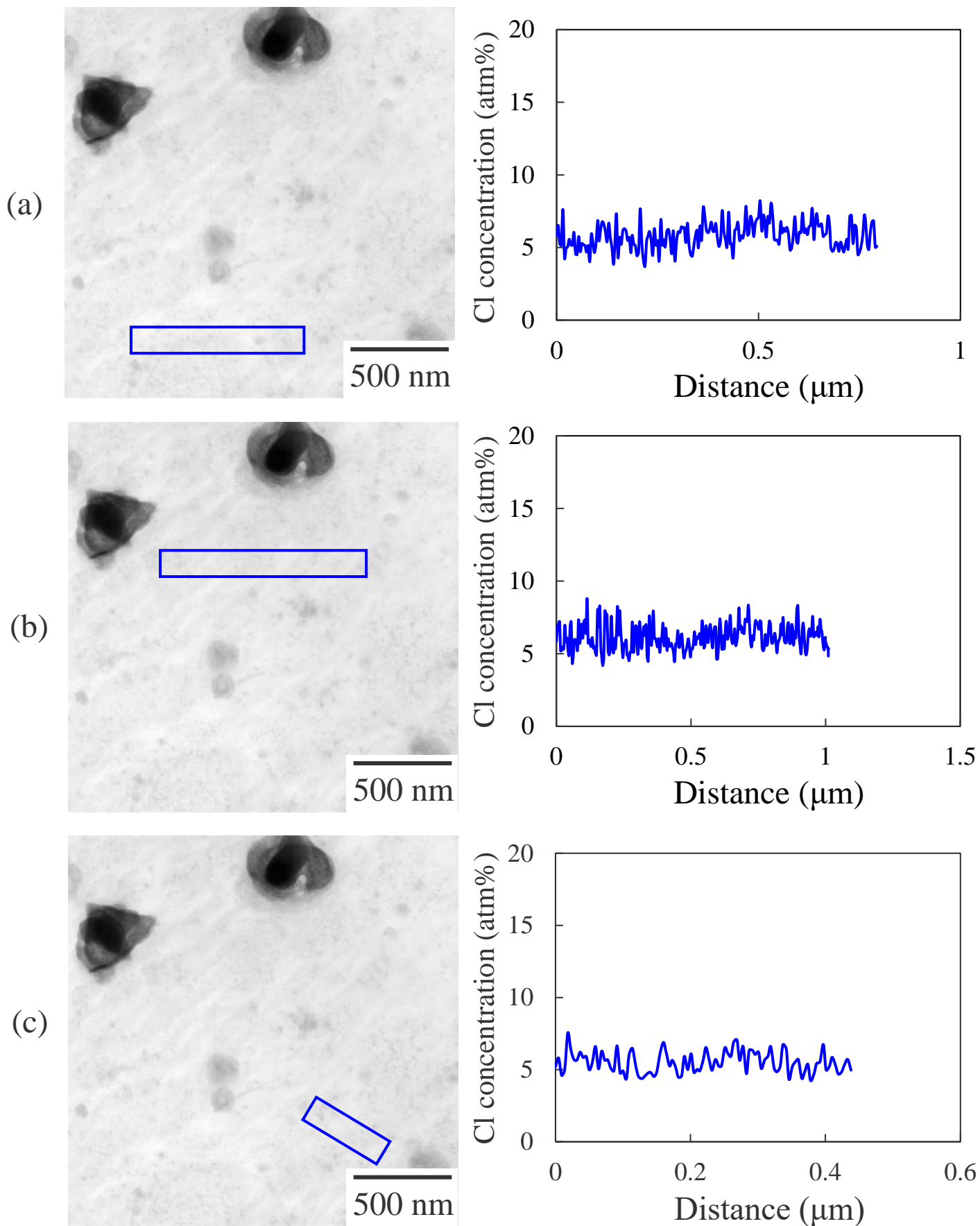


Figure S5. Concentration distribution of chlorine for the 60/40 NBR-H/PVC at different areas.