Supporting Information

for

Semifluorinated Alkylphosphonic Acids Form High Quality Self-Assembled Monolayers on Ag-Coated Yttrium Barium Copper Oxide Tapes and Enable Filamentization of the Tapes by Microcontact Printing

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INSTRUMENTAL PROCEDURES

X-Ray Photoelectron Spectroscopy (XPS). A PHI 5700 X-ray photoelectron spectrometer equipped with a monochromatic Al Kα X-ray source (hν = 1486.7 eV) incident at 90˚ relative to the axis of a hemispherical energy analyzer was used to acquire X-ray photoelectron spectra of the monolayers. The spectrometer utilized a pass energy of 23.5 eV and a photoelectron takeoff angle of 45˚ from the surface. Spectra were obtained at room temperature and at a base pressure of 2×10^{-8} Torr. The peak for the Ag $3d_{5/2}$ binding energy at 368.0 eV was used as a reference for adjusting the binding energy scales for the XPS spectra.

Contact Angle Goniometry. Contact angles were measured using a ramé-hart model 100 contact angle goniometer at room temperature (ca. 293 K). Water was used as a contacting liquid and was dispensed and withdrawn from a Matrix Technologies micro-Electrapette 25 operating at the slowest possible speed (ca. 1 μL/s), and the advancing contact angle (θ_a) was measured while the pipet tip was kept in contact with the drop. For each type of monolayer film, contact angles were averaged from the collected measurements on two separate slides using at least three drops per slide.

Polarization Modulation Infrared Reflection-Absorption Spectroscopy (PM-IRRAS). PM-IRRAS spectra were obtained using a Nicolet Nexus 670 Fourier transform infrared spectrometer equipped with a liquid-nitrogen-cooled MCT detector and a Hinds Instruments PEM-90 photoelastic modulator at 37 kHz. Infrared light was reflected from the sample at an angle of incidence of 80°. The final spectra were acquired from 512 scans at a spectral resolution of 2 cm^{-1}.

Scanning Electron Microscopy (SEM). The surface characteristics of the YBCO superconducting tape were evaluated using images obtained with a LEO-1525 scanning electron microscope operating at an accelerating voltage of 15 kV.

Energy-Dispersive X-Ray Spectroscopy (EDX). The elemental components were determined from EDX spectra collected using a JEOL JSM 6400 scanning electron microscope having a Link Analytical EXL spectrometer.

SUPPLEMENTAL EXPERIMENTAL DATA

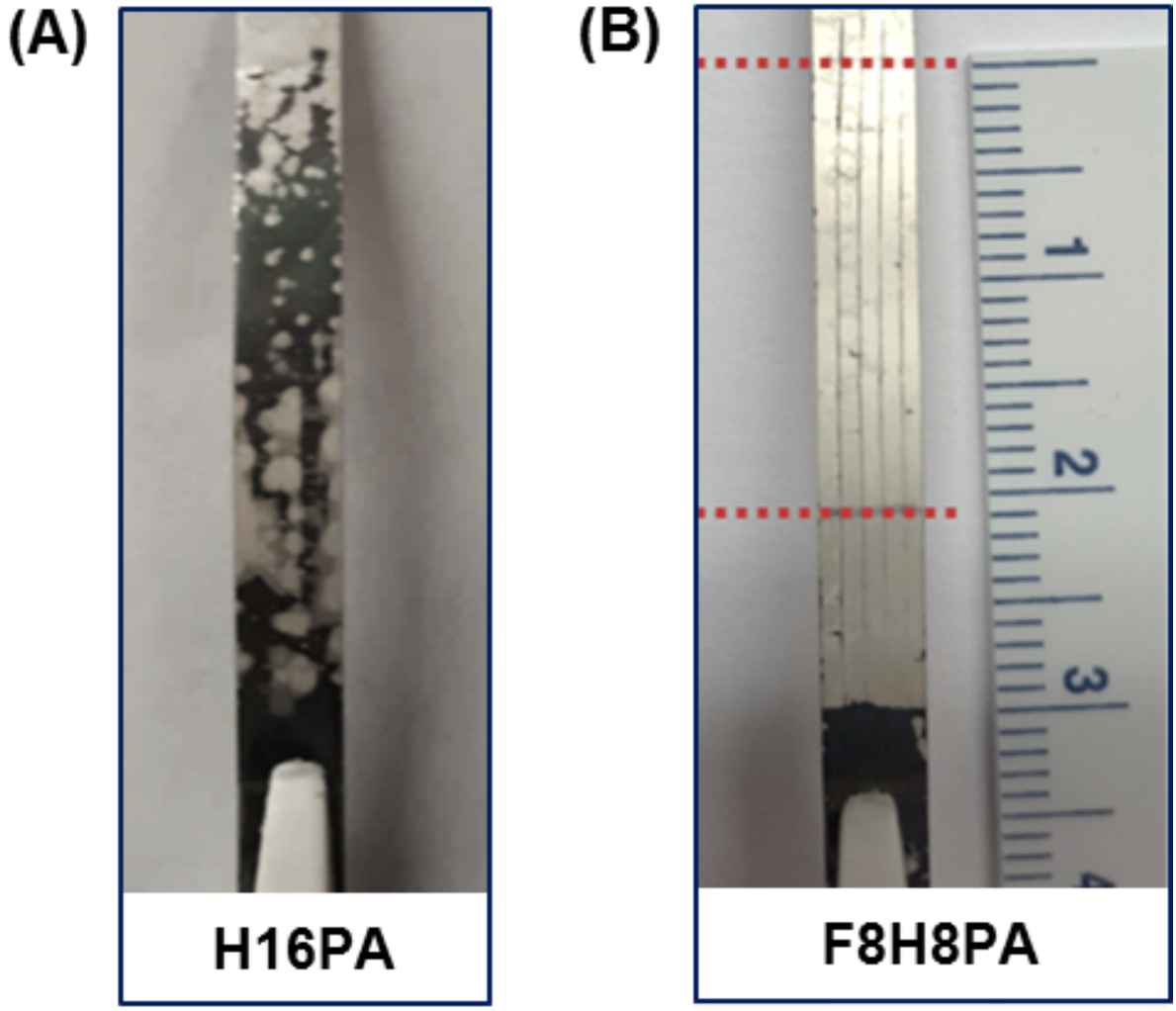

Figure S1. Images of the YBCO tapes stamped with (A) **H16PA** and (B) **F8H8PA** followed by treatment with silver etchant as described in the Experimental Section.

Analysis of the X-Ray Photoelectron Spectra. To evaluate the quality of the monolayers, we examined the ratio of the integrated areas under the binding energy peaks for C/Ag, P/Ag, and F/Ag for the two deposition methods. Table S1 provides the raw peak area data and the calculated ratios for both deposition procedures for the SAMs derived from **H16PA** and **F8H8PA**.

Table S1. C/Ag, P/Ag, and F/Ag Based on Their Relative Intensity

adsorbate	methods	Ag	C	F	O	P	C/Ag	P/Ag	F/Ag
H16PA	Dipping	30245	8793	—	5829	552	0.30	0.018	—
	Manual	28618	9144	—	4886	523	0.31	0.018	—
F8H8PA	Dipping	37500	5450	20590	3817	345	0.14	0.009	0.55
	Manual	25804	4036	15137	2921	265	0.15	0.010	0.58

To compare further the quality of the monolayers, we evaluated the ratio of the integrated areas under the binding energy peaks for C/Ag, P/Ag, and F/Ag between the two deposition methods, obtaining the results shown in Figure S2.

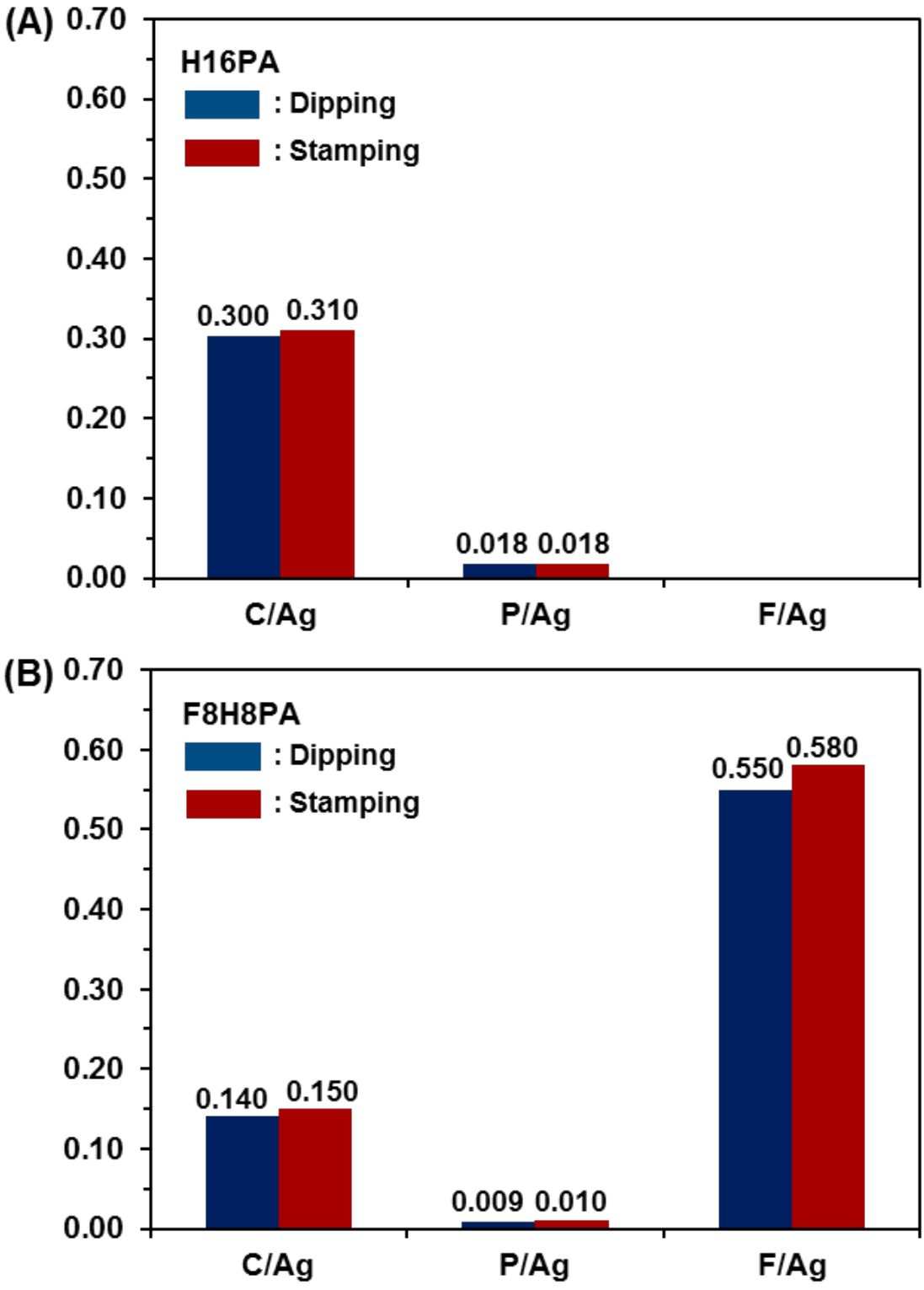

Figure S2. C/Ag, P/Ag, and F/Ag ratios derived from the integrated areas under the X-ray photoelectron spectra binding energy peaks for SAMs formed from (A) **H16PA** and (B) **F8H8PA** prepared by the dipping method (dark blue) or by manual stamping (dark red).