

Supplementary Materials

Guiding Stem Cell Differentiation and Proliferation Activities Based on Nanometer-Thick Functionalized Poly-*p*-xylylene Coatings

Chih-Yu Wu ^{1,2,3,†}, Yu-Chih Chiang ^{3,4,†}, Jane Christy ¹, Abel Po-Hao Huang ^{4,5}, Nai-Yun Chang ¹, Wenny ¹, Yu-Chih Chiu ⁶, Yen-Ching Yang ¹, Po-Chun Chen ^{6,*}, Peng-Yuan Wang ^{7,8,*} and Hsien-Yeh Chen ^{1,2,3,*}

¹ Department of Chemical Engineering, National Taiwan University, Taipei 10617, Taiwan; picorna.tw@yahoo.com.tw (C.-Y.W.); b07504085@ntu.edu.tw (J.C.); Changnaiyun@ntu.edu.tw (N.-Y.C.); r06524094@ntu.edu.tw (W.); youngeddie@cgmh.org.tw (Y.-C.Y.)

² Advanced Research Center for Green Materials Science and Technology, National Taiwan University, Taipei 10617, Taiwan

³ Molecular Imaging Center, National Taiwan University, Taipei 10617, Taiwan; munichiang@ntu.edu.tw

⁴ School of Dentistry, Graduate Institute of Clinical Dentistry, National Taiwan University, Taipei 10048, Taiwan; howhuang6138@ntu.edu.tw

⁵ Division of Neurosurgery, Department of Surgery, National Taiwan University Hospital, Taipei 10048, Taiwan

⁶ Department of Materials and Mineral Resources Engineering, National Taipei University of Technology, Taipei 10608, Taiwan; t107788007@ntut.edu.tw

⁷ Center for Human Tissues and Organs Degeneration, Institute of Biomedicine and Biotechnology, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen 518055, China

⁸ Department of Chemistry and Biotechnology, Swinburne University of Technology, Victoria 3122, Australia

* Correspondence: cpc@mail.ntut.edu.tw (P.-C.C.); py.wang@siat.ac.cn (P.-Y.W.); hsychen@ntu.edu.tw (H.-Y.C.); Tel. +886-2-33669476 (H.-Y.C.); Fax: +886-2-23623040 (H.-Y.C.)

† Chih-Yu Wu and Yu-Chih Chiang contributed equally to this work.

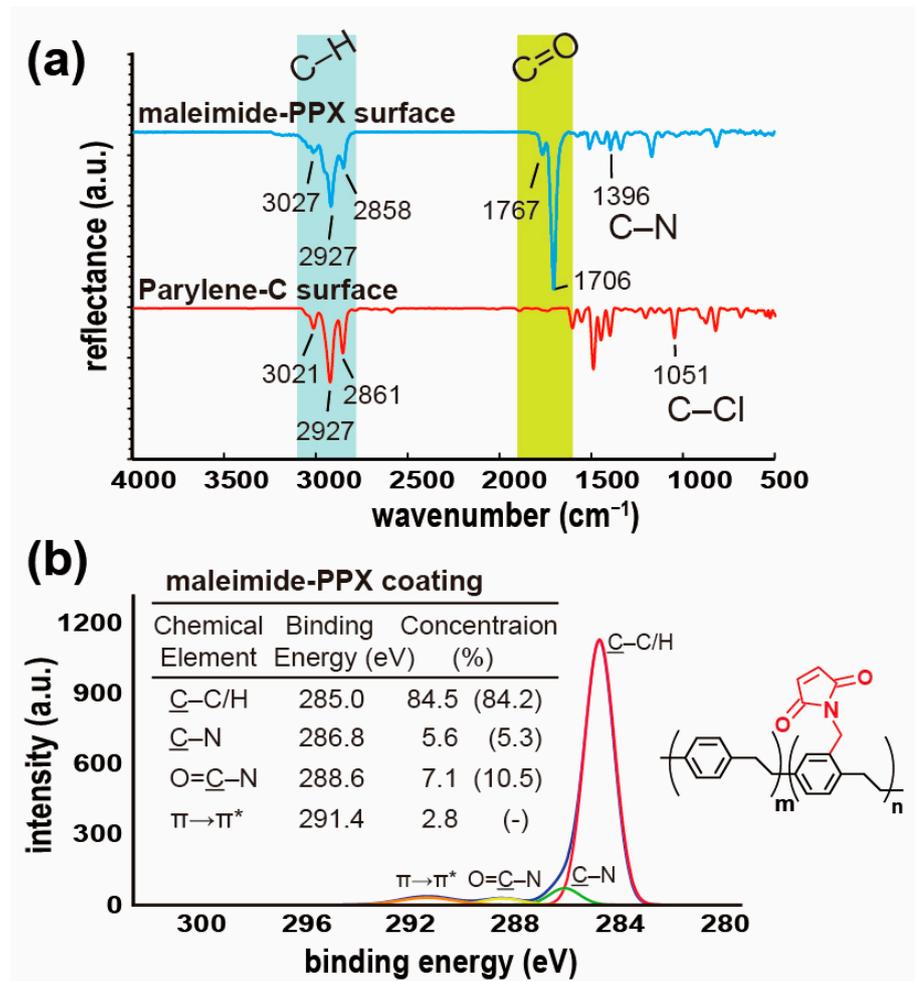


Figure S1. Maleimide-functionalized poly-p-xylylene (maleimide-PPX) coating. **(a)** Infrared reflection-absorption spectroscopy (IRRAS) spectra for the maleimide-PPX coating. The peaks located at 1396 cm^{-1} (C-N), 1706 and 1767 cm^{-1} (C=O) correspond to the characteristic band stretches for the maleimide groups. Infrared reflection absorption spectroscopy (IRRAS) spectra for the Parylene-C coating which has no maleimide was also shown for the better comparison. **(b)** X-ray photoelectron spectroscopy (XPS) characterization of the maleimide-PPX coating. The table compares the experimental values of the XPS survey high-resolution C1 s spectra with the theoretical predictions. The signal at 285.0 eV is attributed to the aliphatic and aromatic carbons (C-C, C-H), and the intensity at $84.5\text{ at}\%$ compares well with the theoretical concentration of $84.2\text{ at}\%$. The C-N bond was detected with $5.6\text{ at}\%$, which compares well with the theoretical value of $5.3\text{ at}\%$. The peak at 288.6 eV was assigned to the O=C-N group of the maleimide ($7.1\text{ at}\%$) and agrees with the theoretical value of $10.5\text{ at}\%$. The signal at 291.4 eV ($2.8\text{ at}\%$) indicates $\pi \rightarrow \pi^*$ transitions.

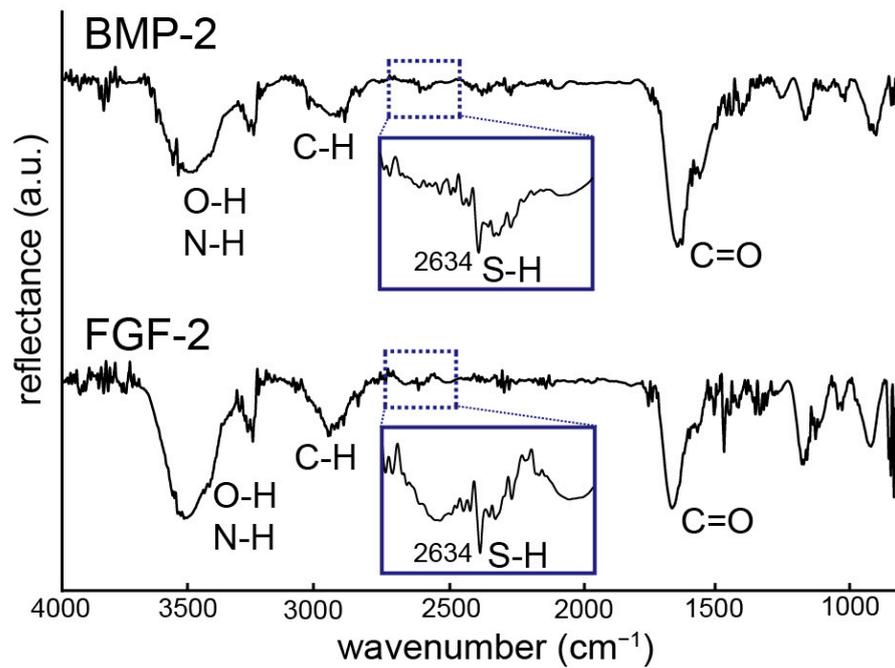


Figure S2. FT-IR spectra of BMP-2 (bone morphogenetic protein 2) and FGF-2 (fibroblast growth factor 2) alone. The thiol groups of the BMP-2 and FGF-2 proteins (i.e., S-H band at 2634 cm^{-1}) in the spectra were highlighted.

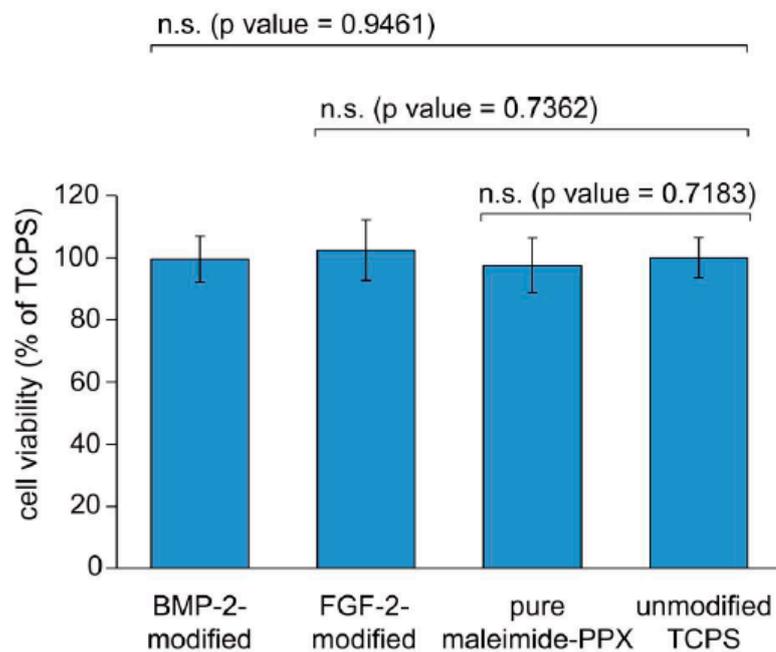


Figure S3. Biocompatibility analysis of the maleimide-PPX coatings. The human adipose-derived stem cells (hADSCs) were cultured on each surface for 1 day and the cell viabilities were then quantified by using a 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The data bars represent the mean value and the standard deviation (\pm SD) based on three independent samples. The p-value large than 0.05 indicates the studied surface has a good biocompatibility with no significant difference (n.s.) as compared to the unmodified TCPS surfaces.