

Supporting Information for

Improving Surface Functionality, Hydrophilicity, and Interfacial Adhesion Properties of High-Density Polyethylene with Activated Peroxides

Mohammadyousef Azimi ^{a}, Edouard Asselin ^a*

^a Department of Materials Engineering, The University of British Columbia, Vancouver, BC,
V6T 1Z4, Canada

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*E-mail: Yousef.azimi@ubc.ca

Differential scanning calorimetry (DSC) measurements were conducted with a Perkin-Elmer STA 600. Samples were heated from 40 to 185 °C at 5 °C/min and then were cooled from 185 to 40 °C while flowing 20 ml/min of nitrogen. Figure S1 shows that there are no noticeable changes in the heat of fusion and, consequently, the crystallinity of the unmodified HDPE versus sample 4 (treated with Co(II)/PMS solution for 20 minutes).

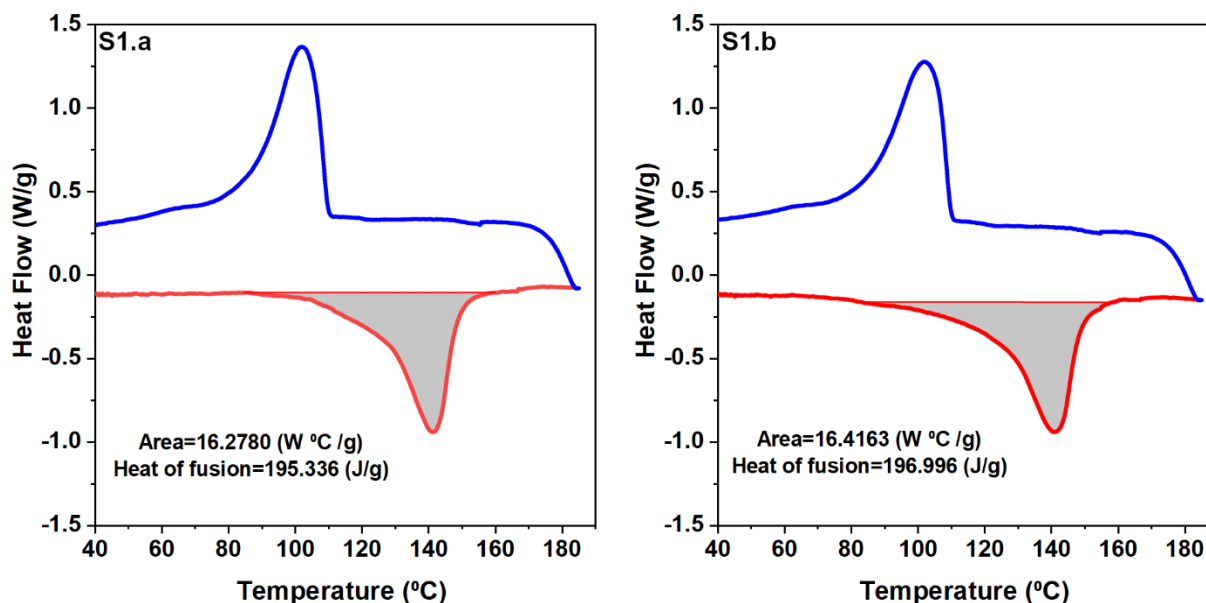


Figure S1. DSC results of the a) unmodified and b) modified (with Co(II)/PMS) HDPE samples

Tensile tests were conducted on an Instron 3345 universal testing instrument with a crosshead speed of 5 mm/min. The sample size was in accordance with ASTM D638 type IV. Elastic modulus was calculated from the initial slope of the stress–strain curve. The results of the tensile test on unmodified and modified HDPE samples are presented in Figure S2 and Table S1, where it is clear that surface treatment of the HDPE sample with the solution of Co(II)/PMS did not have any adverse effects on the mechanical properties of the HDPE.

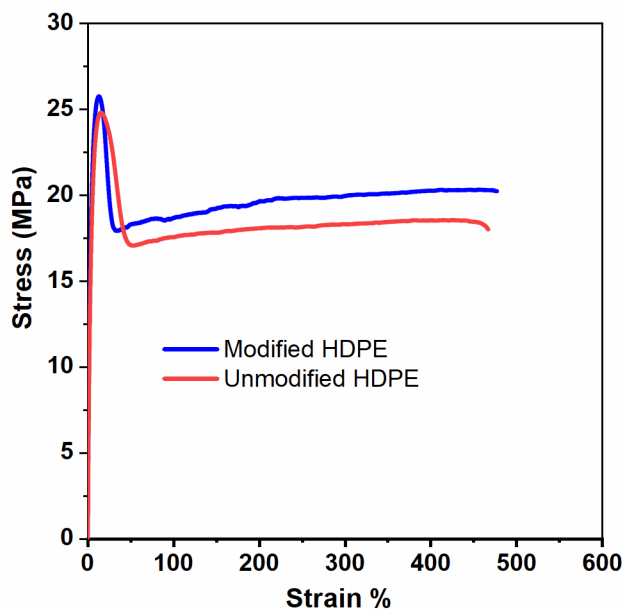


Figure S2. Stress-Strain curve of the unmodified and modified (with Co(II)/PMS) HDPE samples

Table S1. Tensile test results on unmodified and modified (with Co(II)/PMS) HDPE samples

Sample	Tensile Stress at yield (MPa)	Elastic Modulus (GPa)	Elongation at Break (%)
Unmodified HDPE	24.87	0.459	467
Modified HDPE	25.77	0.467	477

Microhardness measurements were performed using a Buehler Micromet 3 with a square-based pyramidal diamond indenter with the angle of 136.0 °. A 100 g load was applied for 15 seconds and the hardness was calculated by measuring the diagonal lengths of the residual indentation on the sample. The results of the Vickers microhardness measurements for the unmodified and modified HDPE samples are provided in Table S2. The changes between the obtained values for unmodified and modified HDPE samples is negligible and below the standard deviation values for each sample.

Table S2. Vickers microhardness measurement results for the unmodified and modified (with Co(II)/PMS) HDPE samples

Sample	d1	d2	HV	Hardness (MPa)
Unmodified HDPE	0.196	0.185	5.12	50.21 ± 1.97
Modified HDPE	0.197	0.182	5.17	50.73 ± 1.43