Supporting Information.

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| **Elements** | **Nude** | **APTES** | **APTES+GA** | **APTES+GA+PSGL-1** |
| O1s | 74.52% | 68.05% | 51.17% | 29.08% |
| C1s | 24.42% | 28.78% | 45.8% | 60.85% |
| N1s | 1.06% | 3.17% | 3.13% | 10.06% |

**Table S1.** Element contents on the modified surface

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**Figure S1.** Electrical characteristics of the poly-Si NWFET

ID−VG curve of the poly-Si NWFET device, the drain current (ID) and gate leakage (IG) were showed

respectively.



**Figure S2.** Eight consecutive measurements of ID-VG of the device

Eight consecutive measurements of the ID-VG curve are shown. Each of the ID-VG curves is close, indicating the stability of the device.

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**Figure S3.** Electrical responses of the functionalized pSNWFET to PSGL-1 sulfation

(A)(B)(C) ID–VG curve obtained from the synthesized sulfated PSGL-1 peptide and interaction with anti-sulfotyrosine, and anti-GST antibodies as the controls. (D)(E)(F) ID–VG curve obtained through PSGL-1 sulfation and interaction with anti-sulfotyrosine, and anti-GST antibodies as the controls. (G)(H)(I) ID–VG curve obtained from non-sulfated PSGL-1 following coupled enzyme treatment without the critical enzyme TPST and the interaction with anti-sulfotyrosine, and anti-GST antibodies as the controls.



**Figure S4.** Real-time response of the pSNWFET following different surface modifications

(A) Response of the pSNWFET with an unmodified surface to anti-GST and anti-sulfotyrosine antibodies. (B) Response of the pSNWFET with a non-sulfated PSGL-1 peptide-modified surface to anti-GST and anti-sulfotyrosine antibodies. (C) Response of the pSNWFET with native PSGL-1 peptide-modified surface following PTS catalyzed by PST–TPST coupled enzyme system to anti-GST and anti-sulfotyrosine antibodies. The conductance was measured at fixed gate voltage. G0 was the conductance obtained from the anti-GST treatment as the baseline, and the changes in the conductance (G/G0 = Ganti-sulfotyrosine/Ganti-GST) were calculated.

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**Figure S5.** pH profile of the PSGL-1 modified surface

The real-time conductance response of the PSGL-1 modified NWFET device in 2 different pH buffers.