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A $\sim 0.3 \mu\text{m}$ $-\text{A} (\text{Na}^+)$ [4]. -
 (substrate), (quartz),
 Avidin $0.9 \mu\text{M}$ [5]. $0.9 \mu\text{M}$ avidin
 biotin $25 \text{ }^\circ\text{C}$ 2
 avidin 2 biotin 가
 μM avidin 0.9

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a) (contact angle) biotin avidin
 piranha solution($\text{H}_2\text{SO}_4:\text{H}_2\text{O}_2=3:1$)
 5° 10 $2\mu\text{L}$
 15 biotin avidin
 $60^\circ, 34^\circ$ 가
 avidin biotin
 biotin avidin

b) XPS (X-ray Photoelectron Spectroscopy) biotin group
 Biotin XPS
 100 % Biotin-UD-TMS $0 \sim 1300 \text{ eV}$
 XPS biotin
 (285 eV), (532.5 eV), (400 eV) (169 eV)
 biotin biotin

c) Avidin UV-visible spectra
 UV-visible spectrophotometer avidin
 $0.9 \mu\text{M}$ avidin uv-vis 2 ml UV-visible

가 . Biotin
 가 avidin
 가 가 biomineralization, self-assembly, biomimetics
 가 [7].

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