

Appendix A/Supplementary Material

Differential Refractometric Biosensor for Reliable Human IgG detection: Proof of Concept

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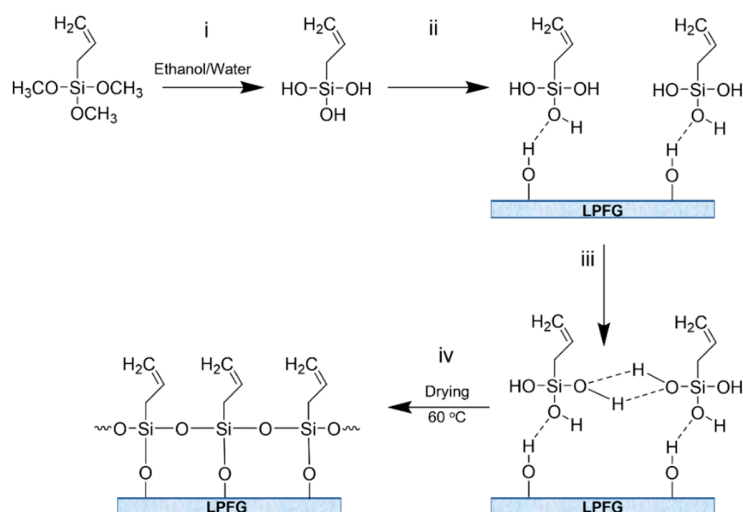
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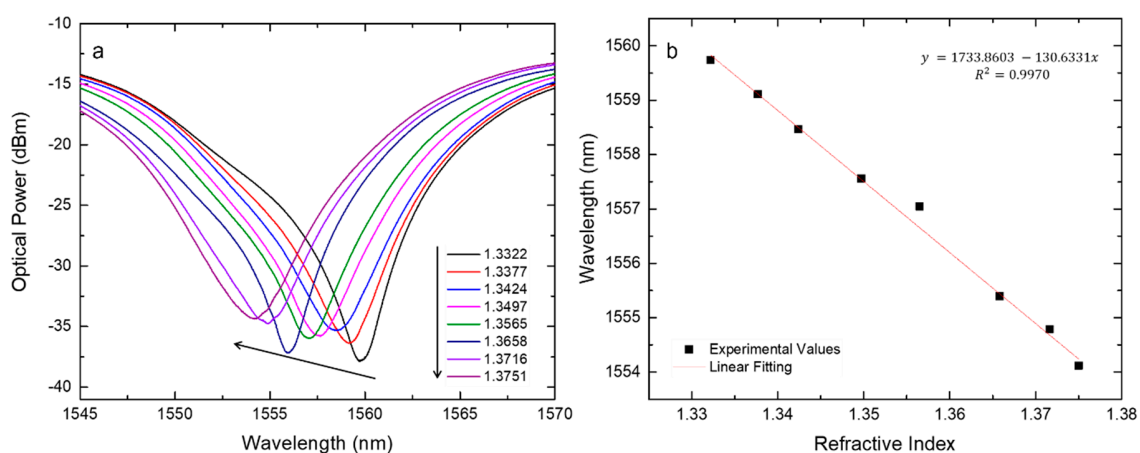
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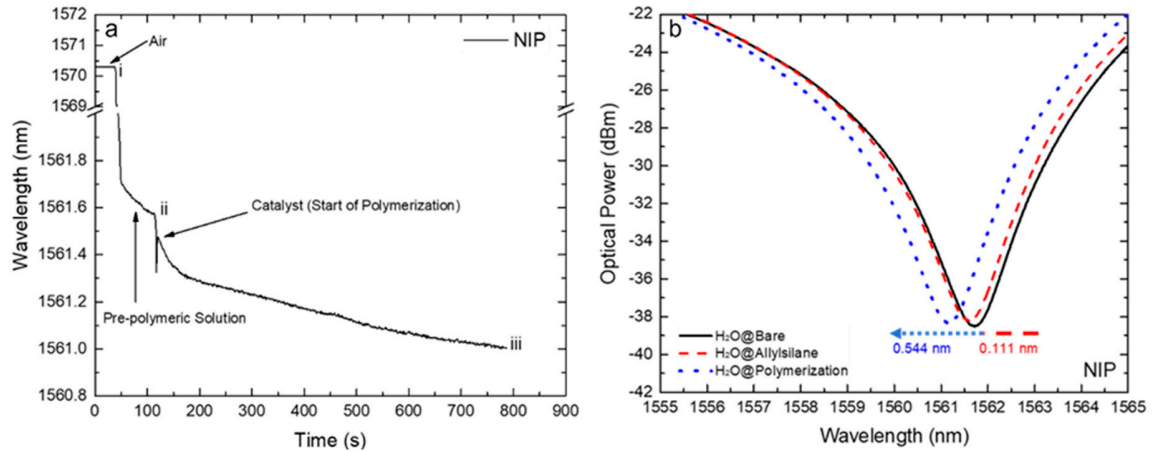
Supplementary figure S1 – Schematic figure of the fiber surface allylation process: i. hydrolysis (formation of -OH groups); ii. chemisorption (reaction of the allylsilane with the LPFG surface); iii. cross-polymerization (reaction between different allylsilane molecules at the LPFG surface); iv. covalent bond formation (monolayer formation).



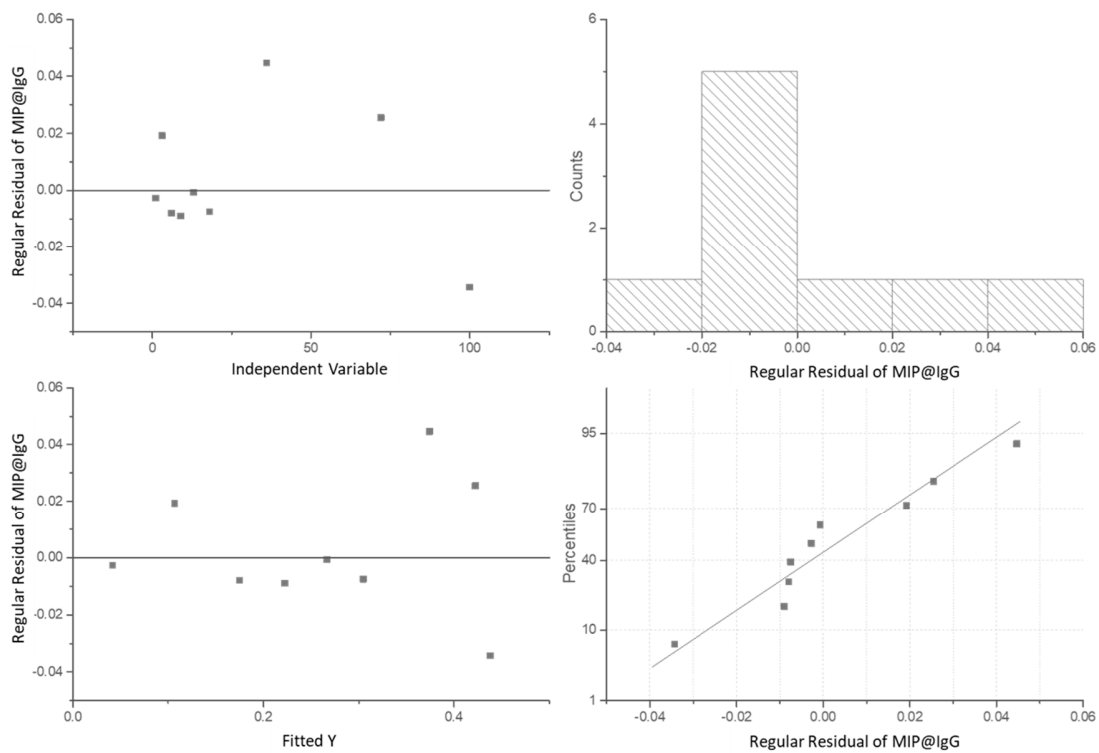
Supplementary figure S2 – (a) Attenuation band spectra for different ethylene glycol refractive index solutions; and (b) respective calibration curve plotting the wavelength position of each attenuation band ($n = 10$) as a function of the refractive index.

Supplementary equation S1, where **FOM** is the Figure of Merit, **S** is the sensitivity of the sensor, and **FWHM** is Full Width at Half Maximum of the resonance wavelength band.

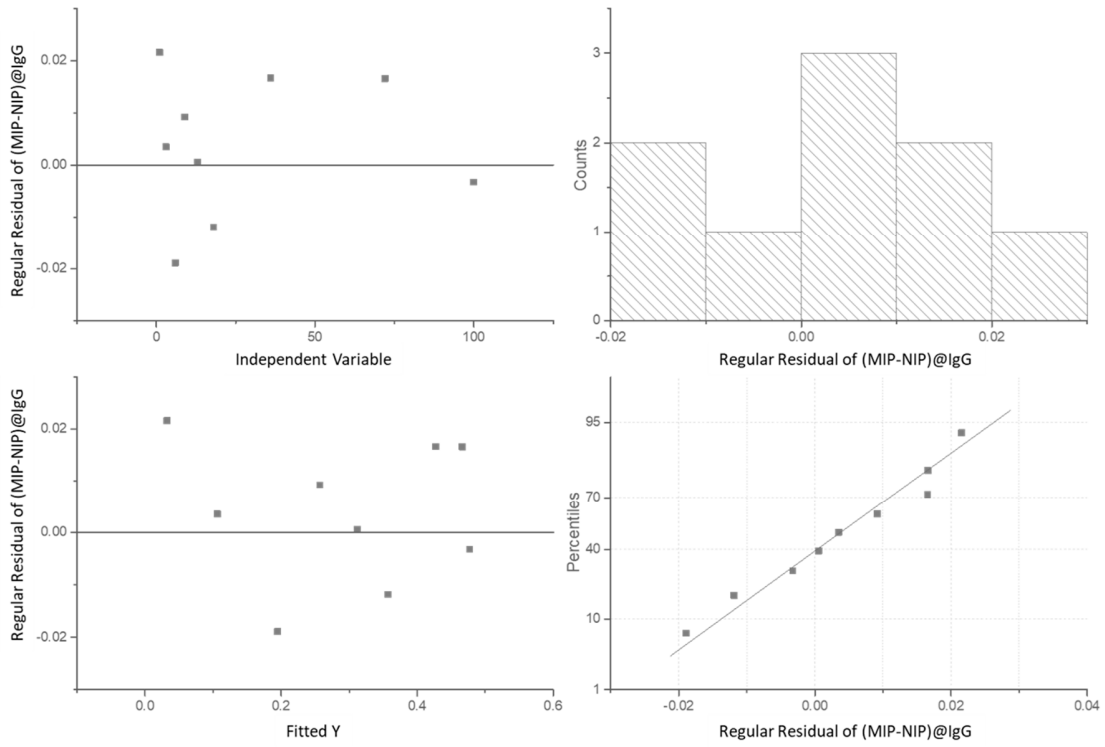
$$FOM = \frac{S}{FWHM} \quad (\text{Equation S1})$$



Supplementary figure S3 - (a) Real timeline of the resonance wavelength position of the NIP polymerization process: i. the pre-polymeric solution was placed; ii. the catalyst was placed; iii. the polymerization process was stopped. (b) Acquired spectra showing the wavelength resonance shift after allyl-silanization process (dashed line) and MIP layer formation (dotted line). Solid line is the bare fiber spectrum in water.



Supplementary figure S4 – Residual Plots resulted from the Hill fitting of the MIP@IgG curve.



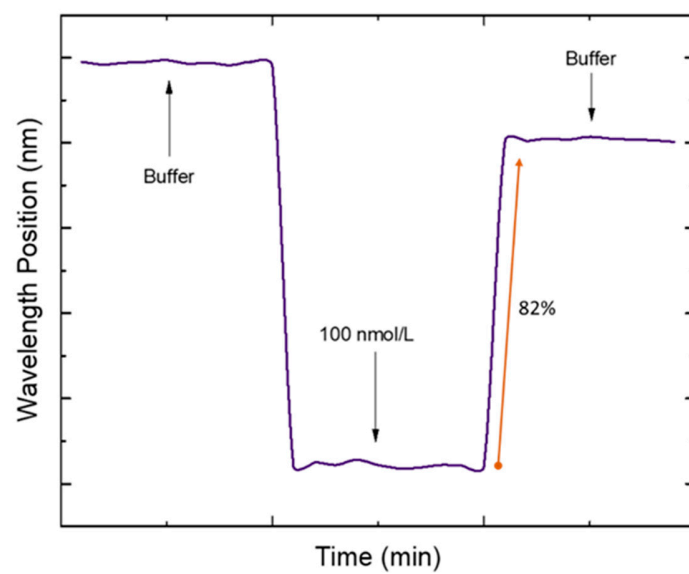
Supplementary figure S5 – Residual Plots resulted from the Hill fitting of the (MIP-NIP)@IgG curve.

Supplementary equation S2, Hill model equation where $\Delta\lambda_c$ is the wavelength variation at the concentration C ; $\Delta\lambda_{max}$ is the wavelength variation at the saturation point (or response to the infinite); K is the ligand concentration at the $1/2 \Delta\lambda_{max}$; and n is the Hill coefficient.

$$\Delta\lambda_c = \frac{\Delta\lambda_{max} \times C^n}{(K^n + C^n)} \quad (\text{Equation S2})$$

Supplementary equation S3, where β_2 relates with the selectivity and activity of the ions, β_1 is the slope parameter, and σ is the standard deviation of the blank.

$$LOD_{S/N} = \beta_2 \left(10^{\frac{3\sigma}{\beta_1}} - 1 \right) \quad (\text{Equation S3})$$



Supplementary figure S6 – Wavelength peak position of the differential (MIP-NIP) shifting over time throughout reversibility trials.