Control and stability of self assembled monolayers under biosensing conditions

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Effect of Plasma treatment on the SiO$_2$ layer investigated by IR spectroscopy.

Figure S1: Absorption spectra of freshly cleaned SiO$_2$/Si substrate before (a) and after (b) O$_2$ plasma treatment. Spectrum (c) is the difference absorption emphasizing the changes due to the plasma treatment. A removal/disturbance of the SiO$_2$ absorption bands occurs during the treatment.
**Estimation of the SiO₂ damages due to the O₂ plasma treatment**

Previous infrared spectroscopy investigations in our laboratory on silicon samples (Fz, double sides polished) have shown that for samples with 10 Å silicon oxide (on each side) gives an integrated area of 0.33 cm⁻¹. The measurement is performed in transmission (~70° incidence) and the thickness is measured by ellipsometry. The integrated area is measured between 900 cm⁻¹ and 1300 cm⁻¹, which covers the LO and TO modes of the SiO₂ present.

According to the SiO₂ absorption spectra shown in Fig. S1, recorded before and after O₂ plasma treatment, an integrated area of 2.86 cm⁻¹ and 2.84 cm⁻¹ is estimated, respectively. These areas correspond to thicknesses before and after treatment of 8.6 nm and 8.1 nm, respectively. Note that these thicknesses are in good agreement with the 6.7 nm SiO₂ thickness (ellipsometry thickness) of our starting wafers. We can then conclude that the O₂ plasma treatment leads to SiO₂ removal/damage in the top 5 Å of the SiO₂ layer. Considering the large range of thickness found in the literature corresponding to a 1 monolayer of SiO₂ (from 0.2 to 0.47nm), the damages are confined in the two first monolayers.