Supporting information for:

Importance of the dynamics of adsorption and of a transient interfacial stress on the formation of aggregates of IgG antibodies

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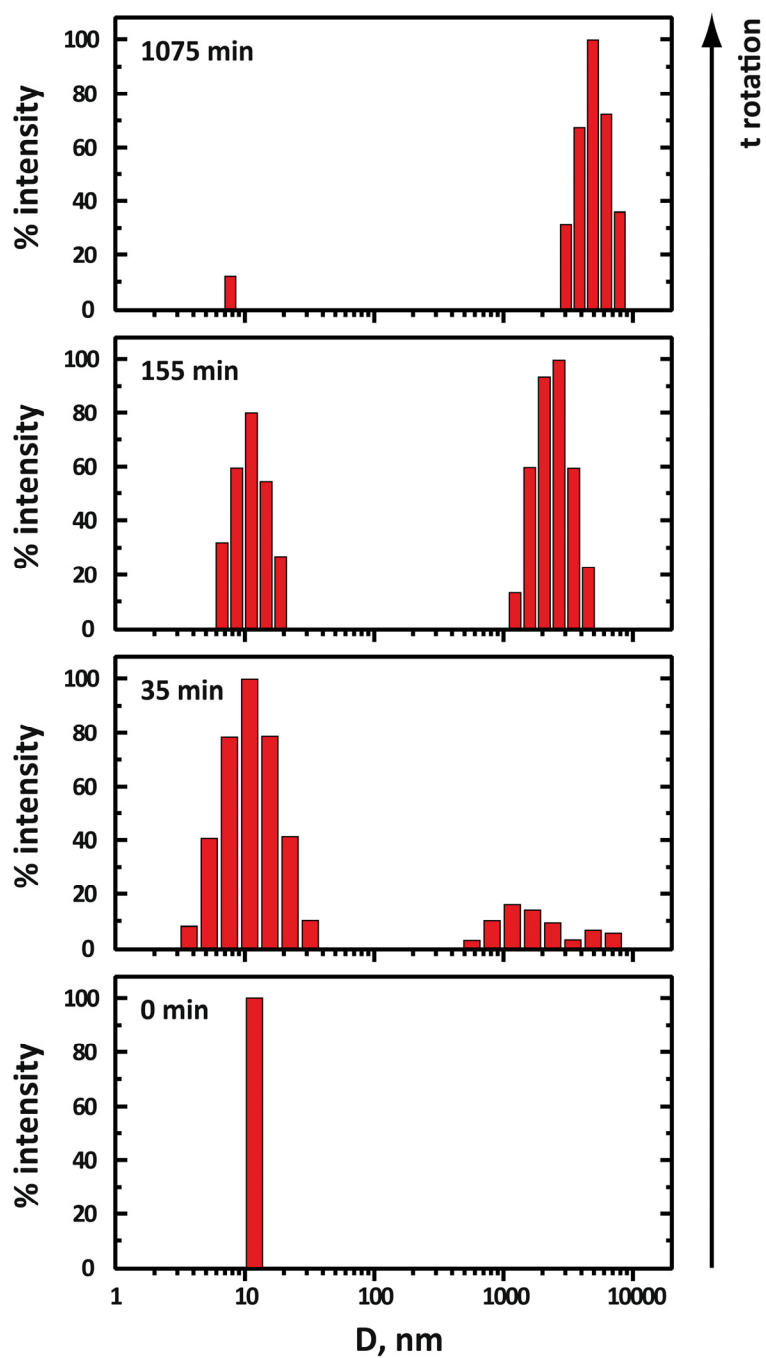* Corresponding author. E-mail : christophe.tribet@ens.fr

Figure S1. DLS size distribution of IgGp solution as function of the time of rotation with needle. 1.5 g/L IgGp in 36 mM citrate buffer pH 6.8 at rotation speed of 137 rpm, temperature 22°C. Quotes in the diagrams are the values of rotation time. D is the hydrodynamic diameter calculated using Brookhaven NNLS software (cf. Experimental section).
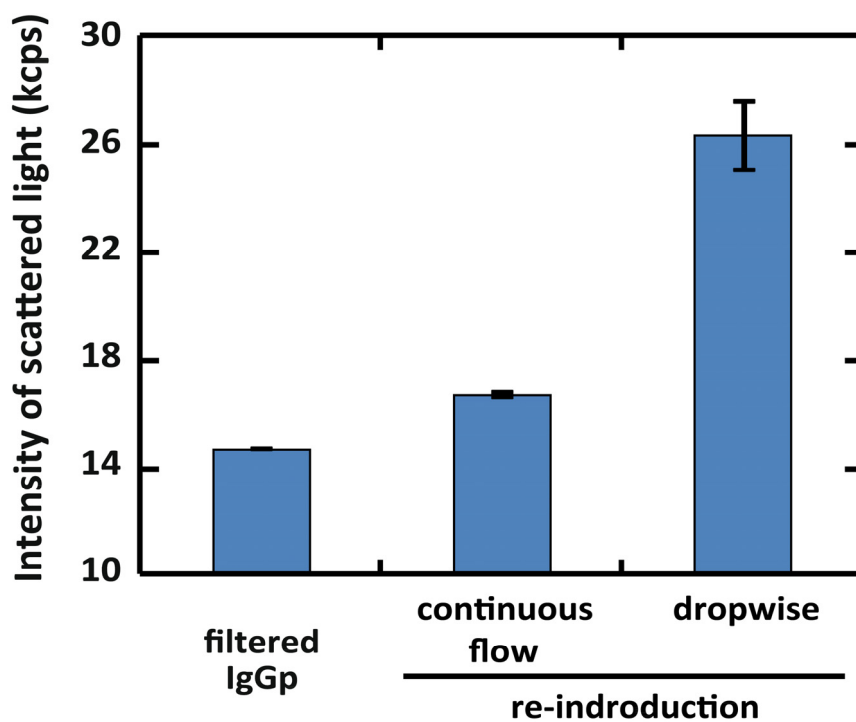
Figure S2. Dropwise flow of solutions inducing antibodies aggregation. As shown by the intensities of scattered light by 1.5 g/L IgGp solutions in 36mM citrate buffer pH 6.8, T=22°C. "filtered" meant for the initial sample just after filtration through 0.2 μm syringe filter; "re-indroduction" meant for samples after four fold re-introduction of half of the sample (0.5mL) in the measurement cell either dropwise (~$\sum$ 60 drops) or by gentle flow along the wall of the tube ("continuous flow").
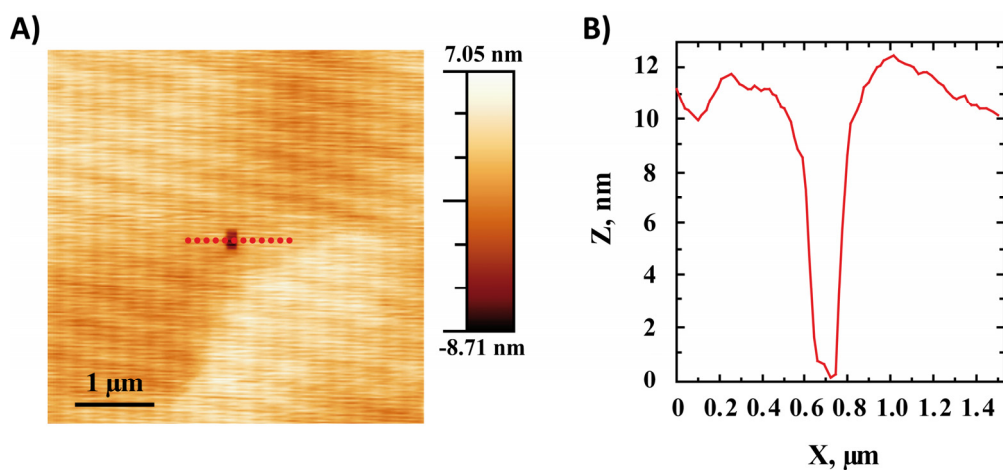
A)

7.05 nm

-8.71 nm

1 µm

B)

Figure S3. AFM evidence of the presence of IgG monolayer at the mica surface. (A) AFM image, and (B) Height profile taken along dashed line shown in A, of "scratched" mica surface that was i) wetted with IgG solution, ii) rinsed with water, and iii) dried. To form the scratch, the corresponding zone that was initially at the same height as the rest of the surface, was scanned while maintaining a constant (200pN) force on the cantilever.
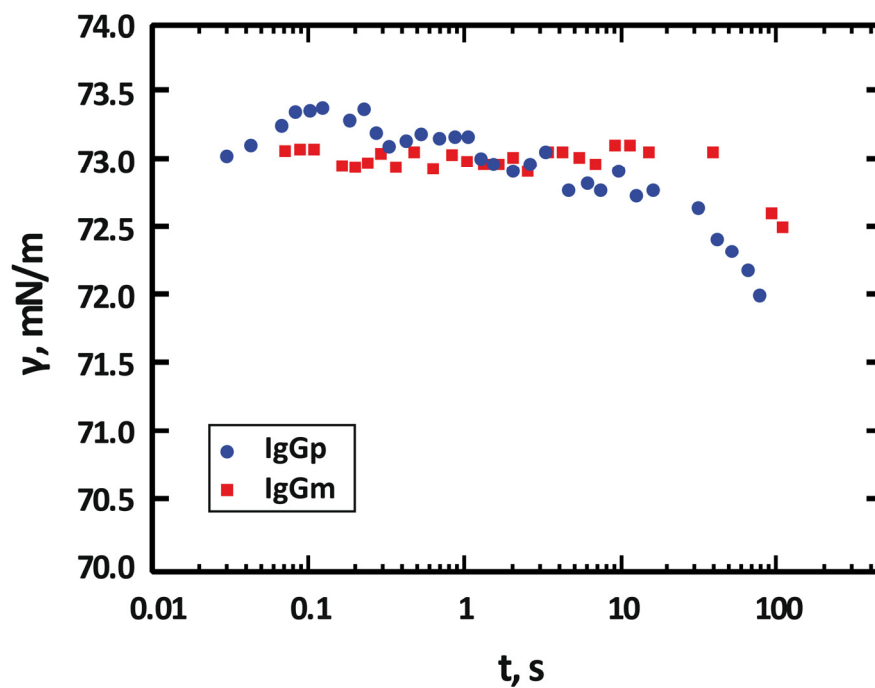
Figure S4. Dynamic surface tension of 1.5 g/L antibodies measured by the maximum bubble pressure method for IgGp (blue circles) and IgGm (red squares); 36 mM citrate buffer pH 6.8; T = 22°C. The onset of the effect of protein adsorption on surface tension is detected beyond 20-30 s.
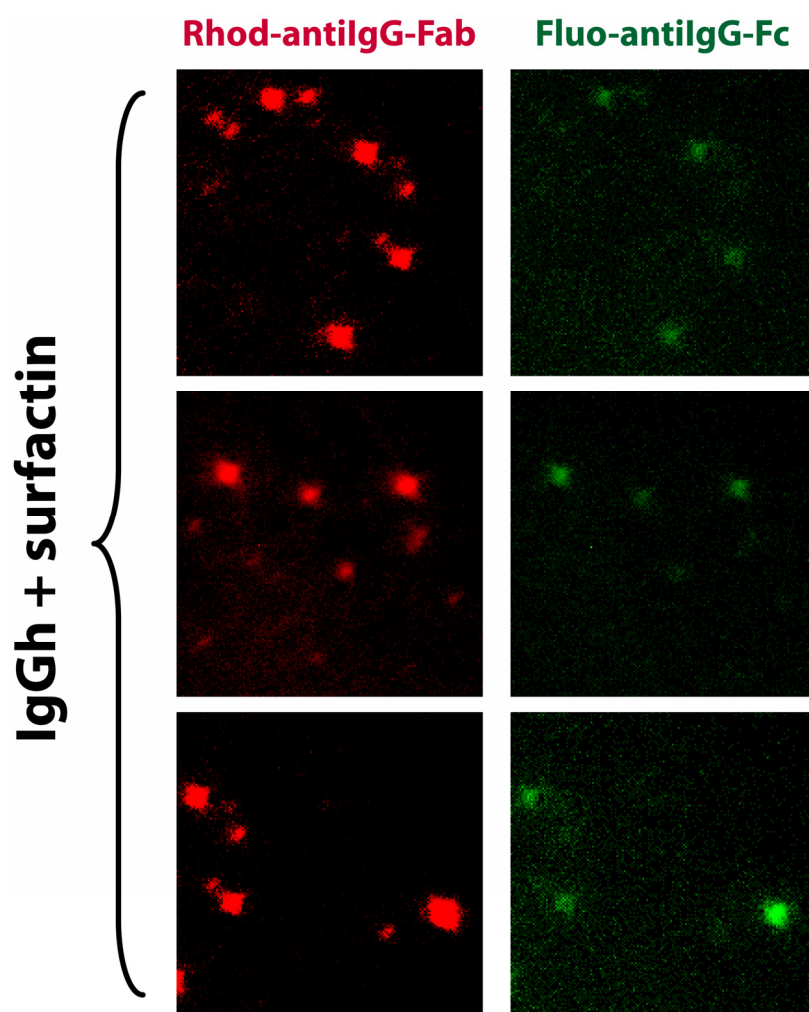
Figure S5. Fluorescent microscopy observation of IgGp immobilized on mica in the presence of surfactin. IgGp was deposited on freshly cleaved mica by a brief horizontal contact with the interface of IgGp-surfactin solution (1.5 g/L and 0.05 mM respectively) of 1 min age. Fluorescent microscopy images were obtained after extensive rinsing of the mica with water followed by incubation with a solution of BSA and then anti-IgG markers (a 1:1 molar mixture of Rhod-antiIgGh-Fab and Fluo-antiIgGh-Fc). Left column corresponds to excitation at 515−560 nm and emission recorded at 590nm (rhodamine fluorophore), and right column corresponds to the same position with excitation at 460−500 nm and observation filter of 527-560 nm (fluorescein fluorophore). All images are squares of 15 μm × 15 μm.

surfactant	σ_{40s}, mN/m	chain length	CMC, mM
surfactin	< 49	14*	0.0075
Tw80	62	17**	0.012
FC14	59	14	0.12
TTAB	65	14	4.5
FC12	67	12	1.5
C12NO	67	12	1
LSNa	70	11	14.4
FC10	72	10	11

* iso-C14
** contains one double bond

Table S1. Characteristic physical parameters of surfactants listed in the order of protective efficiency against IgG aggregation. In the first column, surfactants are ranked in order of decreasing protection as found in figure 6. Other columns present, (σ_{40s}) DST surface tension at time 40s (from figure 7), surfactant's chain length, "CMC" critical micellar concentrations (taken from Sigma-Aldrich (www.sigmaaldrich.com) for surfactin and TTAB, and from Anatrace products catalog (www.affymetrix.com) for other surfactants). Experiments were conducted above the CMC of Tw80 and surfactin, and below CMC of other surfactants.