Supporting Information

Validation of the Monte-Carlo SAW algorithm used to simulate the conformation of the terminally attached chain.

Polymer physics predicts that the end-to-end distance of a long polymeric chain in solution should be given by $R_F^* = R_F / a = \gamma N^{\nu}$, with γ a constant of the order of unity and ν a universal critical exponent (de Gennes, P. G. *Scaling Concepts in Polymer Physics*; Cornell University Press: Ithaca, NY, 1991). For infinitely long chains in solution it is predicted that ν~0.6. For end-attached chains, values of ν = 0.6 ± 0.02 are typically reported (Lemak, A.S.; Balabaev, N. K.; Karnet, Y. N.; Yanovsky, Y. G. *J. Chem. Phys.* **1998**, *108*, 797-806). Therefore, the value of ν = 0.615 we find here validates our simulation algorithm (see Figure S1).

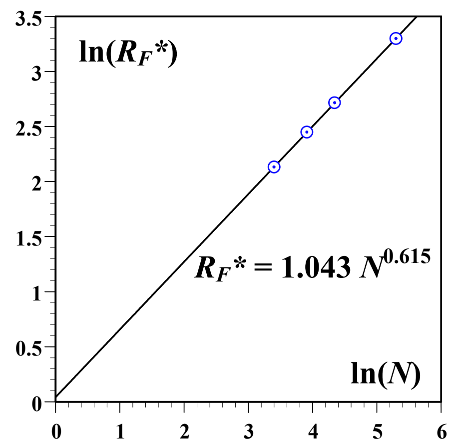

Figure S1: Monte-Carlo Self-Avoiding Walk simulation of the conformation of a terminally grafted chain. Dependence of the end-to-end distance R_F^* of the terminally attached chain on the number of monomers N .

Moreover the specific effect of chain grafting on the aspect ratio of the anchored polymer chain is reproduced by our simulations as the ratio of the mean square coordinate of the free-end of the chain in the direction perpendicular to the surface ($<X^2>$) over the one in the direction parallel to the surface ($<Y^2>$) tends to the expected value of ~2 as the chain length increases toward infinity (see Figure S2).

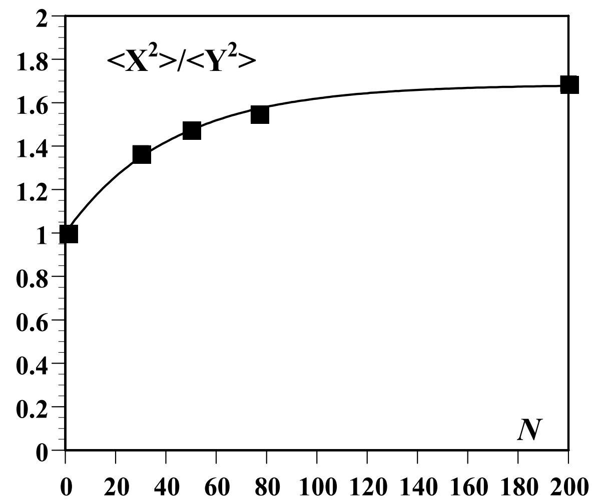

Figure S2: Monte-Carlo Self-Avoiding Walk simulation of the conformation of a terminally grafted chain. Variation of the ratio of the mean square coordinate of the free-end of the grafted-chain in the direction perpendicular to the surface ($<X^2>$) over the one in the direction parallel to the surface ($<Y^2>$), as a function of the chain length (N, number of monomers).

Expression of the elastic bounded positive feedback current at a spherical tip of finite radius.

The following expression gives the elastic bounded positive feedback current i at a spherical of radius $R^*_{tip} = R_{tip} / a$.

$$i = \frac{2\pi R_{tip}\Gamma FD}{a^2}\int_{d^*}^{+\infty} \psi\left(d_{TLC}{}^*, k^*_{spr}, x^*_e\right)\left[1-\left(d_{TLC}{}^* - d^*\right)\Big/R^*_{tip}\right]\partial d_{TLC}{}^* \qquad \text{(S1)}$$

Ψ being given by eq (4)