1. Supplementary information

1.1. Colloidal stability

Stability of the nanoparticles was studied as a function of salinity of the medium using NaCl as aggregating salt. According to the classical DLVO theory, salinity increases trigger the aggregation of lyophobic colloidal systems. The speed of aggregation of such systems in response to defined changes in salinity can thus be used to quantify the stability.

Particle aggregation was analysed by photon correlation spectroscopy (PCS) using a Nano-ZS instrument (Malvern Instruments, UK). After 60 µl of sample was poured into a disposable UV-transparent ultra micro cuvette (Brand, UK) 30 µl of the saline solution at the desired ionic strength was added and rapidly mixed. The aggregation measurements lasted around 5 min. For information on the aggregation kinetics, the average diameter of the particles was plotted against time. The slopes of these curves ($\partial d/\partial t$) enabled the determination of the aggregation rate (k) for the different systems and hence calculations of the stability or Fuchs factor (W) defined by:

$$W = \frac{\left(\partial d / \partial t\right)_f}{\left(\partial d / \partial t\right)_s} = \frac{k_f}{k_s} \qquad \text{(S1)}$$

where k_f corresponds to the fastest aggregation kinetic, and k_s is the rate constant for a slower aggregation regime. Therefore, when W=1 the colloidal system is totally unstable, while W→∞ indicates a stable colloidal system. Plotting W as a function of the medium salinity in a double-logarithmic scale becomes very useful to estimate the critical coagulation concentration (ccc) (the point where W reduces to 1) and the critical stabilization concentration (the point where W increases from 1 to ∞ when the salt concentration is increased even more). The *ccc* value, defined as the minimum salt concentration needed for a diffusion controlled aggregation, is related to destabilization processes; a low ccc means low stability. While the *critical stabilisation concentration csc*, defined as the minimum salt concentration at which the system begins to re-stabilize when salinity is increased even more, is associated with surface hydrophilicity. It should be noted that high hydrophilic surfaces will present re-stabilization processes at lower salt concentrations, that is lower *csc* values, that those surfaces with higher hydrophobicity, that is the former will present lower csc values than the latter. For more details see references [1-4].

1.2. In vitro studies

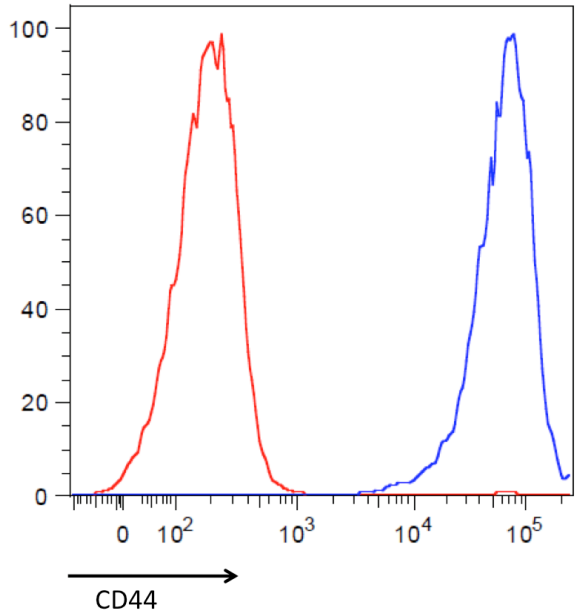

Figure S1. CD44 expression level of MDA-MB-231cells stained with APC-labelled antibodies. Histograms illustrate all the cells in the alive population collected from 20.000 single cell events.

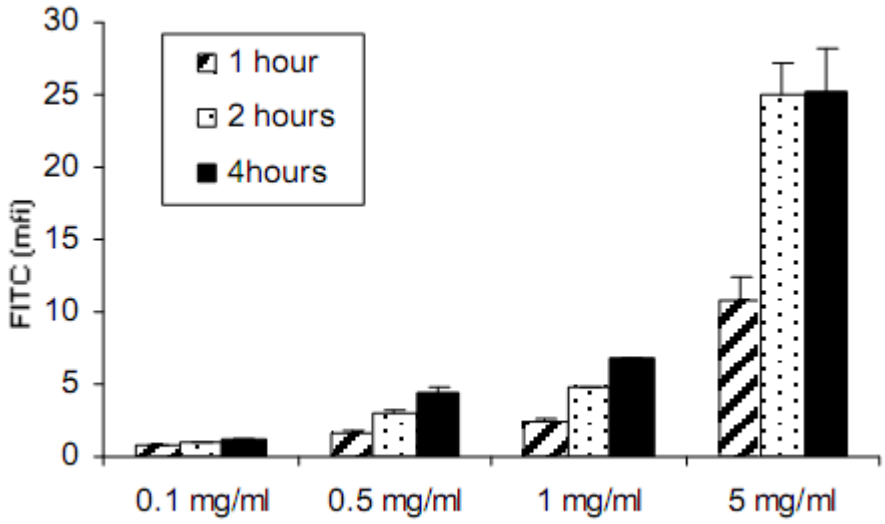

Figure S2. Time and concentration dependency of HA uptake in MDA-MB-231 cells. Experiments were carried out with fluoresceinamine (fl) labelled HA .

2. References

1. M. J. Santander-Ortega, D. Bastos-Gonzalez and J. L. Ortega-Vinuesa, *Colloids Surf B Biointerfaces*, 2007, **60**, 80-88.

2. T. Lopez-Leon, M. J. Santander-Ortega, J. L. Ortega-Vinuesa and D. Bastos-Gonzalez, *J Phys Chem C*, 2008, **112**, 16060-16069.

3. M. J. Santander-Ortega, M. V. Lozano-Lopez, D. Bastos-Gonzalez, J. M. Peula-Garcia and J. L. Ortega-Vinuesa, *Colloid Polym Sci*, 2010, **288**, 159-172.

4. M. J. Santander-Ortega, J. M. Peula-Garcia, F. M. Goycoolea and J. L. Ortega-Vinuesa, *Colloid Surface B*, 2011, **82**, 571-580.