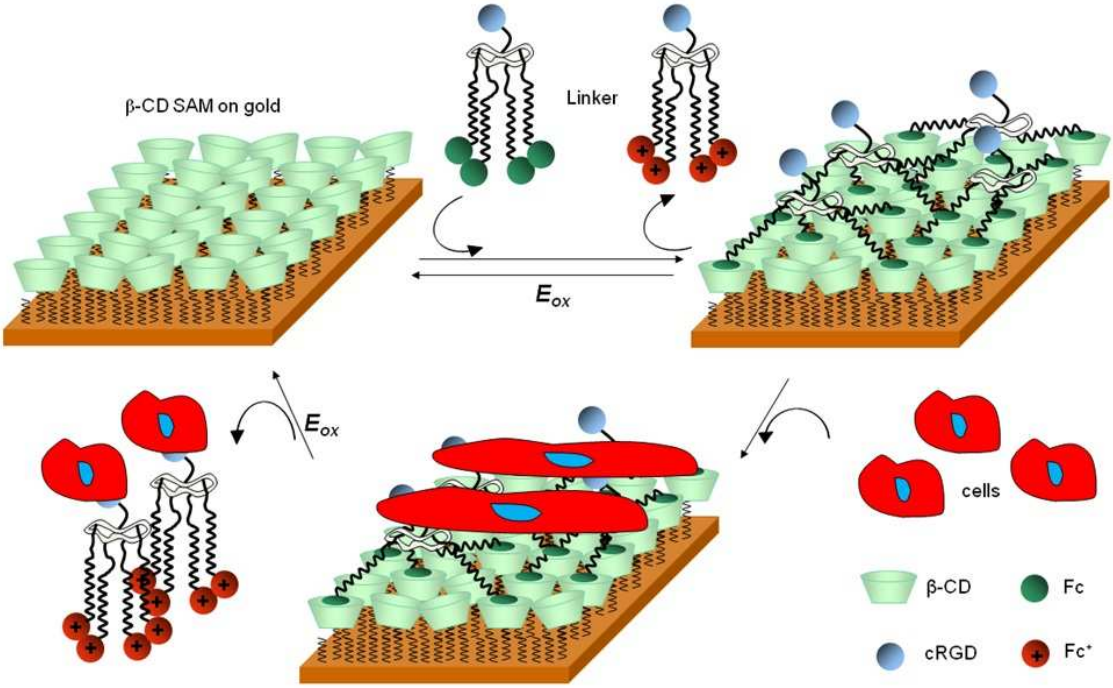
Designs of new stimuli-responsive interface for bio-applications

D. Thakar[a], L. Coche-Guérente[a], G. Dubacheva[a], R. Auzély-Velty[b], P. Schaafc, F. Boulmedais[c], L. Jierry[c], P. Dumy[a], D. Boturyn[a] and P. Labbé[a]
thakar.dhruv@gmail.com

[a]Département de Chimie Moléculaire (DCM), UMR CNRS-UJF 5250, ICMG 2607, Grenoble, FRANCE
[b]CERMAV-Grenoble, [c]ICS-Strasbourg



Capture and controlled release of cells is of high current interest for potential applications in biosensors and biomedical sciences, such as for selective capture and release of circulating tumor cells (CTCs) from the blood of a patient who succumbed to advanced metastatic cancer. Our strategy of cell capture and release is based on orthogonal linkers, providing redox-switchable multivalent host-guest (Cyclodextrin (β-CD)/Ferrocene (Fc)) interactions[1]. The design of switchable interface takes advantage of the decrease in affinity of Fc in its oxidized state with β-CD. In this context, we designed a regioselectively addressable cyclodecapeptide scaffold that presents in a spatially controlled manner two independent functional domains, the structural feature permits a clustered (Fc) guest domain for the anchoring onto β-CD SAM surface and a domain with cell-adhesive ligand (cyclic-(Arg–Gly–Asp) i.e. cRGD). The bifunctional linker was designed to have cRGD as it has been shown to have strong affinity and selectivity towards the αvβ3 integrin. The human embryonic kidney cells, HEK 293(β3) were chosen as the cell model as they overexpress αvβ3 integrin. Applying an electrochemical stimulus induces the oxidation of ferrocene and hence the release of captured cells leading to the regeneration of the β-CD SAM platform.

[1] Dubacheva, G. V et al, Chem. Commun., 2011, 47, 3565-3567