Creation of arrays of carbohydrate nanoclusters

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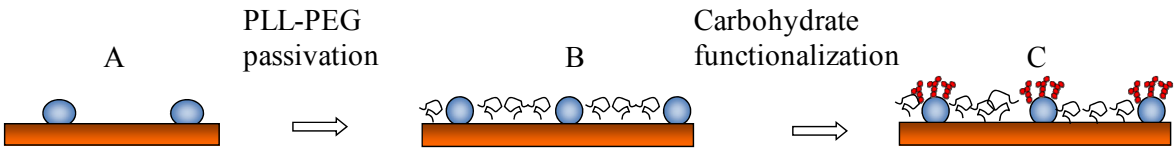

Figure 1. Passivation and functionalisation of gold nanodots A) gold nanodots on a silica surface, B) gold nanodots and passivated silica surface, C) gold nanodots functionalised with mannose.

The surface of mammalian cells is covered with different carbohydrates that are involved in the biological activity of the cell membrane via protein-carbohydrate interactions. These interactions are rather weak and this low affinity is compensated by a multivalent presence of the glycoconjugates, where the carbohydrates are arranged in the form of clusters that establish a multivalent interaction with the proteins.

To mimic the carbohydrate clusters on the cell membrane we aim at selectively functionalising regular arrays of gold nanodots with mannose. The arrays of gold nanodots were created by block copolymer micelle nanolithography, where the size of the nanodots and interdot-spacing can be controlled, to meet the needs of each application. We study the selective mannose functionalisation of gold and the passivation of silica by means of QCM-D. Selective binding of Concanavilin A, a mannose-binding lectin protein, to the functionalised surfaces were also tested.

Our initial results suggest that gold nanodots arrays selectively functionalised with carbohydrate moieties could be promising platforms for the spatially controlled presentation of carbohydrate clusters, for protein or cell binding studies.