Reversible protein binding to surfaces via photosensitive linkers

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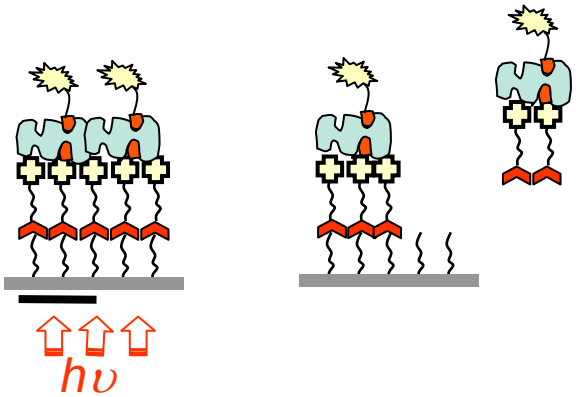
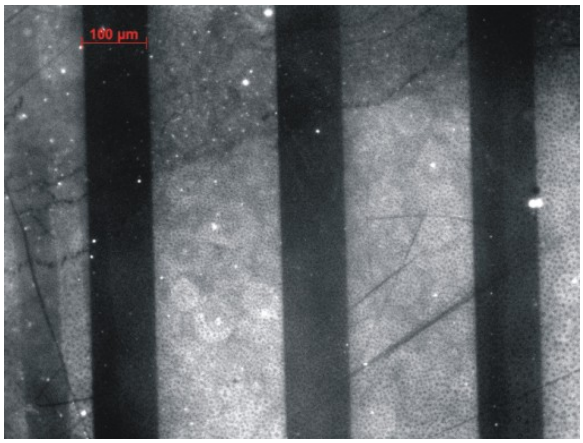
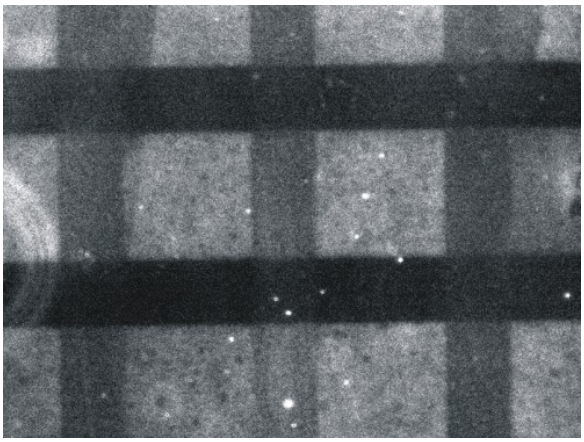
The development of smart surface coatings for specific and functional attachment of proteins at surfaces is an important issue in many biomedical fields, ranging from more sensitive and accurate biosensors to effective protein purification tools, or better scaffolds in tissue engineering. For some applications, reversible binding of the protein to the surface is required. In this work, we propose a novel strategy to attach and detach proteins to/from surfaces in a controlled manner by using surface coupling agents possessing intercalated photoremovable cages. Initial protein attachment is controlled by the end-functionality of the selected coupling agent. Subsequent protein detachment is controlled by light irradiation. Upon exposure, the intercalated cage is cleaved and the end-functional groups are removed from the surface irreversibly. Consequently, proteins loose their surface anchoring point and leave the surface. This principle is currently extended to controlled attachment and detachment of cells.

Figure 1. *Protein pattern after two step exposure. Proteins were initially patterned onto vertical stripes by covalent attachment to a prepatterned substrate. A second exposure step removes the attached protein from horizontal stripes.*





Initial protein pattern



Superposed protein pattern