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Thermochemical nanolithography of multi-functional templates for selective assembly of bioactive proteins DEBIN WANG, VAMSI KODALI, WILLIAM UNDERWOOD, JONAS JARVHOLM, TAKASHI OKADA, SIMON JONES, MARIACRISTINA RUMI, ZHENTING DAI, WILLIAM KING, SETH MARDER, JENNIFER CURTIS, ELISA RIEDO — Atomic force microscopy based techniques have been successful in generating protein nano-arrays on various substrates. However, several challenges still exist in terms of resolution, writing speed, cost, substrate choice, protein bioactivity, multi-component patterning, and surface passivation. Recently, we have developed the use of thermochemical nanolithography combined with post covalent functionalization and molecular recognition on a polymer surface of a single chip to produce multiplexed nanopatterns at speeds of mm/s. These patterns can then be functionalized under native conditions to create tailored nano-assemblies of two different species of proteins coexisting on the same surface. The proteins attach selectively and strongly to the nanopatterns via covalent and/or specific interactions, while retaining their ability to interact specifically with other proteins in buffered solution. At present, this method has produced nanopatterns of bio-active proteins with features as small as 40 nm on polymer films. This technique opens up new possibilities in nanoscale manipulation of biological macromolecules as well as many molecular biophysics studies such as inter-protein interactions.

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