81g Templated Deposition of RNA-Functionalized Colloids

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The directed adsorption of colloids and macromolecular systems such as polyelectrolyte multilayers is of interest for the production of micron-scale features within organic thin films; such patterned films could be used in electrochromic devices, proteomic arrays, and sensors based on molecular recognition. We have previously demonstrated the ability of chemical surface templates to pattern the construction of polyelectrolyte multilayers; recently, this approach has been extended to polyelectrolyte-functionalized colloids, making possible the assembly of multi-component colloidal arrays via selective adsorption. In order to design more complex arrays, we have sought to broaden the range of interactions used to guide adsorption. Multiple-hydrogen bonding is of particular promise for such applications as this type of interaction is both highly specific and readily modulated via temperature and pH. In this work, we explore the ability of ribonucleotide base pairing to direct the assembly of microspheres; RNA homopolymers polyadenylic, polycytidylic, polyguanylic, and polyuridylic acid were layered onto microspheres as well as patterned onto surfaces via polymer-on-polymer stamping. We also explore the self-assembly properties of colloids asymmetrically functionalized with complementary polybases.