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Template-mediated catalysis of DNA tiles CORINNA MAASS, XIAOJIN HE, RUOJIE SHA, YOEL OHAYON, NADRIAN SEEMAN, PAUL CHAIKIN, New York University — We present a novel mechanism for the selective creation of irreversible bonds between DNA nanotiles in the presence of a DNA template of complementary joined DNA tiles. The hybridisation transition of DNA sticky ends is highly concentration dependent. While immobilised on a template, adjacent DNA tiles are subject to a greatly increased local concentration (10^{12}), as compared to free tiles in solution. This reduces the entropy penalty for sticky end hybridisation and shifts the hybridisation transition to higher temperatures. We have developed a tile-template model consisting of two DNA tiles with sticky ends that will, at room temperature, only react when attached to template tiles and which can be bound irreversibly via an UV crosslinkable nucleobase substitute. The selectivity is high and the irreversible crosslinking is enhanced by a factor of roughly 100.

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