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### **Self-Replication of Nanoscale tiles and patterns**

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We want to make a “non-biological” system which can self-replicate. The idea is to design particles with specific and reversible and irreversible interactions, introduce seed motifs, and cycle the system in such a way that a copy is made. Repeating the cycle would double the number of offspring in each generation leading to exponential growth. Using the chemistry of DNA either on colloids or on DNA tiles makes the specific recognition part easy. In the case of DNA tiles we have in fact replicated the seed at least to the third generation. The DNA linkers can also be self-protected so that particles don't interact unless they are held together for sufficient time – a nano-contact glue. Chemical modification of the DNA allows us to permanently crosslink hybridized strands for irreversible bonds and a new type of photolithography. We have also designed and produced colloidal particles that use novel “lock and key” geometries to get specific and reversible physical interactions.

With Tong Wang, Ruojie Sha, Remi Dreyfus, Mirjam E. Leunissen, Corinna Maass, David J. Pine, and Nadrian C. Seeman.