

**Using lateral capillary forces to  
compute  
by self-assembly**

**Paul W. K. Rothemund†**

Mark Garcia

7.349

4 May 2005

# Purpose

- Will tile sets that encode computations be more likely to defect formation?
- What rules must SA follow to orient successfully?

# Materials and Methods

- Tiles were laser cut, sprayed with acrylic blue and the paint was cut to make defining patterns
- Each step involved moving one structure; interaction with another was termed a bond
- Tiles were shaken with *n*-hexadecane superphase and an aqueous sodium metatungstate subphase

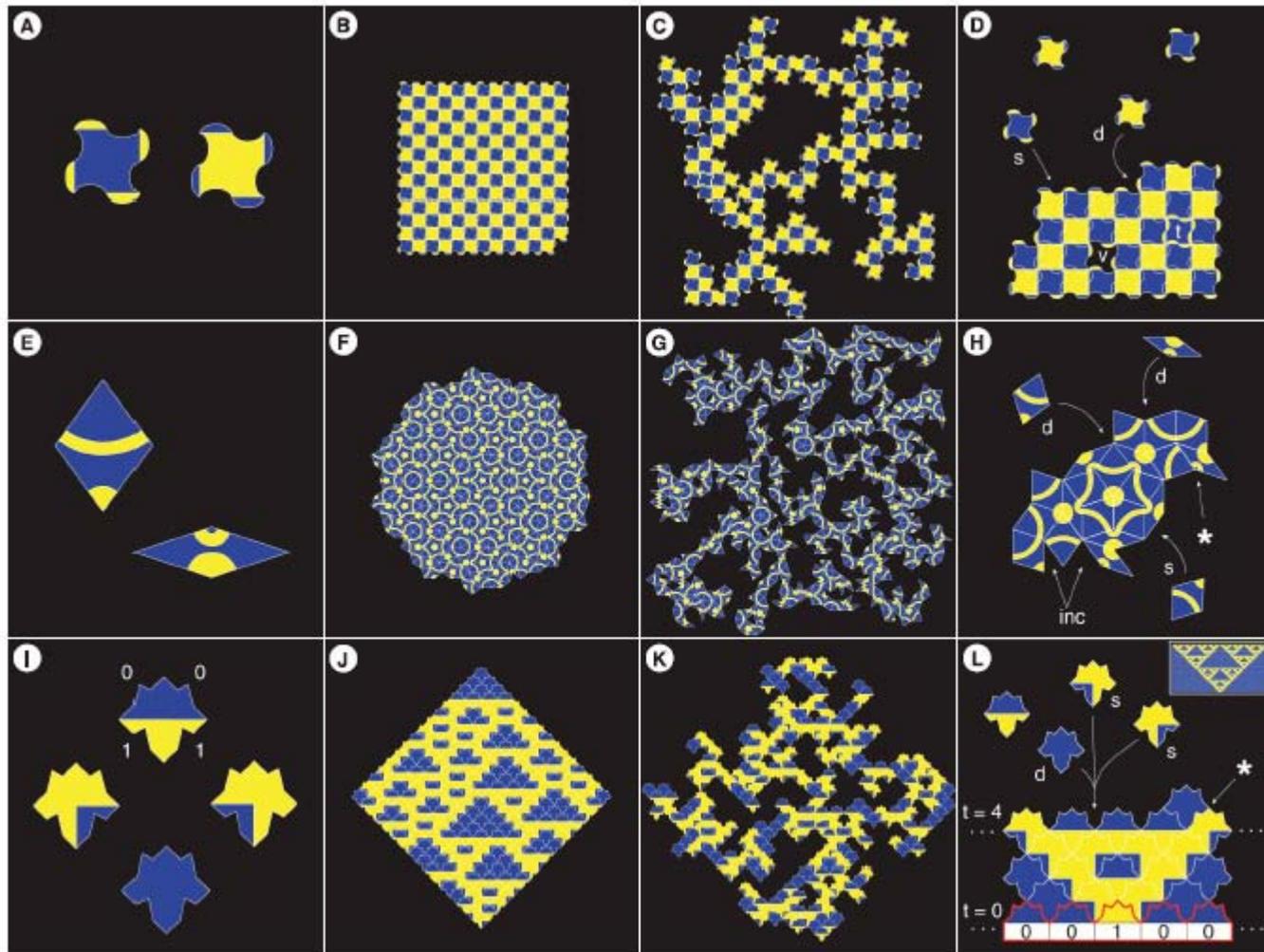


Figure from Rothemund P. W. "Using lateral capillary forces to compute by self-assembly." *Proc Natl Acad Sci U.S.A.* 97, no. 3 (Feb 1, 2000): 984-9. Copyright 2000 National Academy of Sciences, U.S.A. Used with permission.

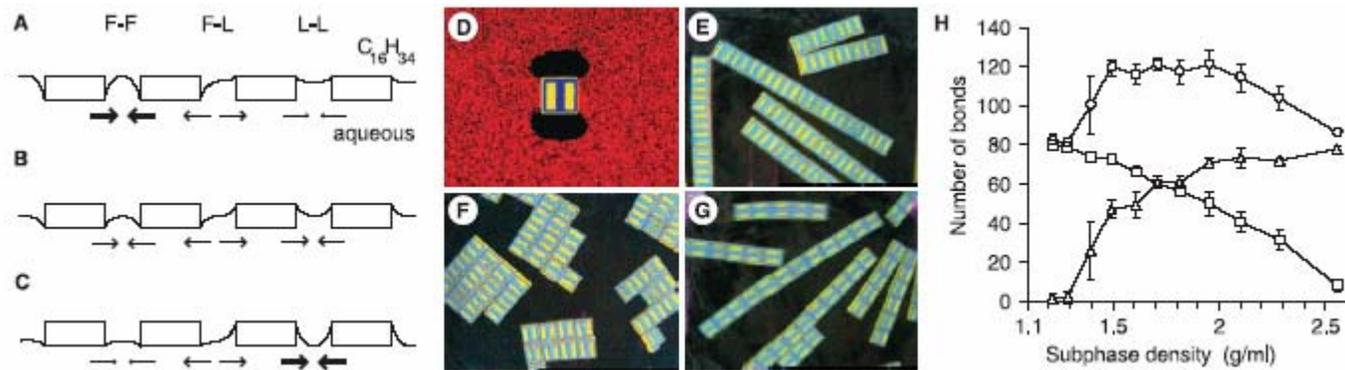


Figure from Rothemund P. W. "Using lateral capillary forces to compute by self-assembly." *Proc Natl Acad Sci U.S.A.* 97, no. 3 (Feb 1, 2000): 984-9. Copyright 2000 National Academy of Sciences, U.S.A. Used with permission.

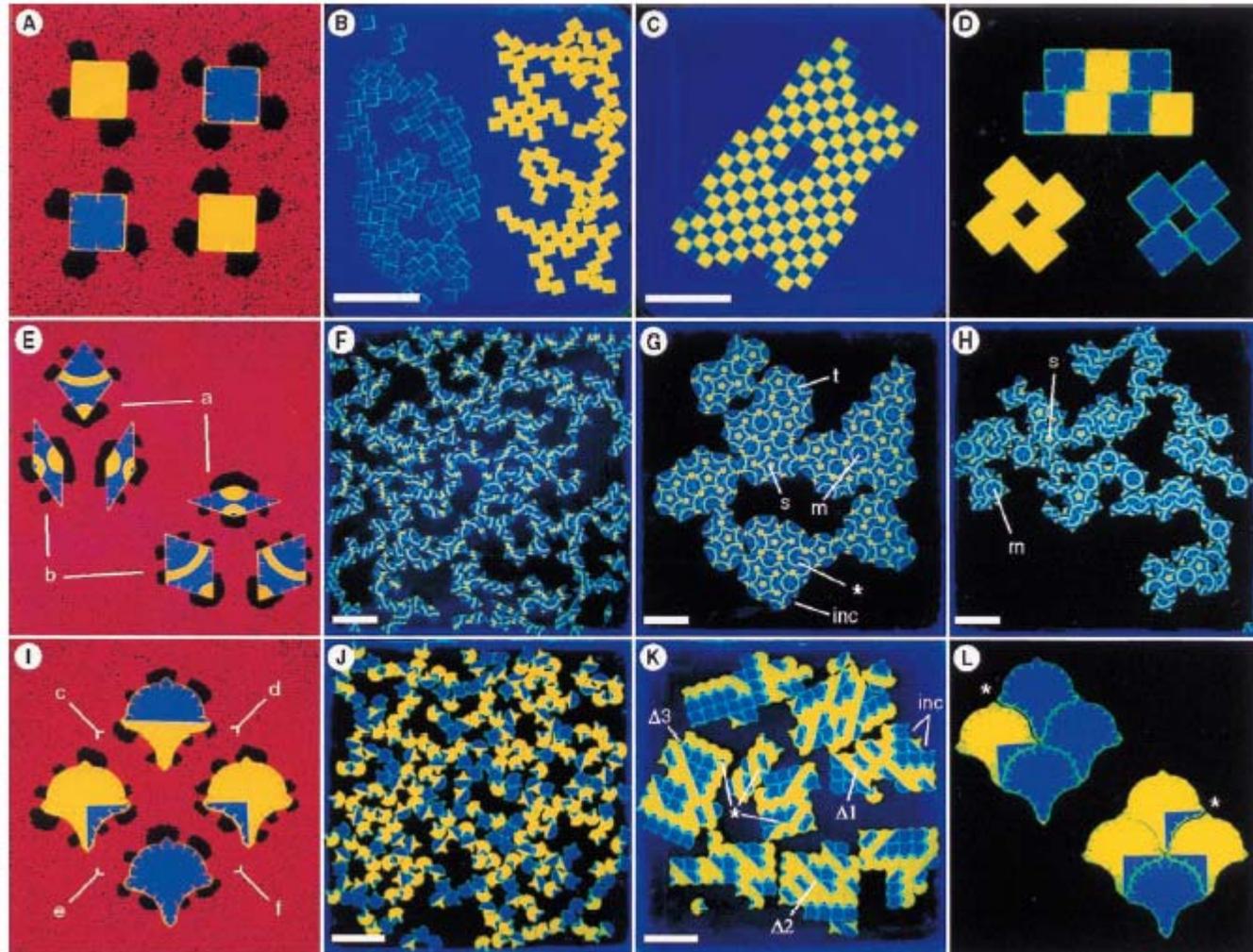


Figure from Rothmund P. W. "Using lateral capillary forces to compute by self-assembly." *Proc Natl Acad Sci U.S.A.* 97, no. 3 (Feb 1, 2000): 984-9. Copyright 2000 National Academy of Sciences, U.S.A. Used with permission.

# Conclusions

- Tiles must bind reversibly
- Associations must be cooperative
- WCs can be used to enforce matching rules for a simple computation
- WCs made binding of tiles cooperative