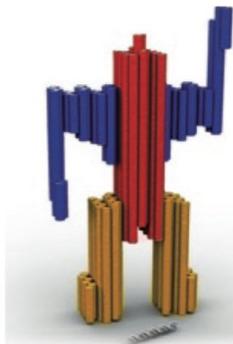


# DNA Scaffold and Staple Strands

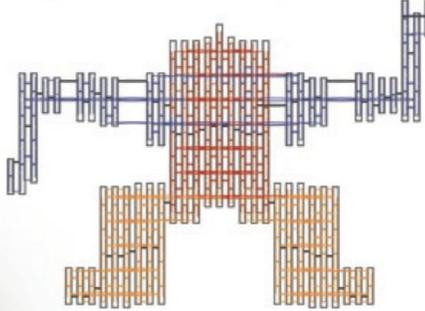
## Student Sheet

- **Materials Needed:** DNA Scaffold and Staple Strands Sheet, 6 pipe cleaners (3 of the same color), pen or pencil, scissors.
- To review each of our pipe cleaners represent:
  - Scaffold: the straight strands that are bent and folded to create our shapes
  - Staple: the helix strands that give our structures support
- **Challenge Question:** What are the steps that we will take to “manufacture” our DNA origami?
  - **Answer:** From Charlie’s Slide...

**Step 1:** conceive a target shape



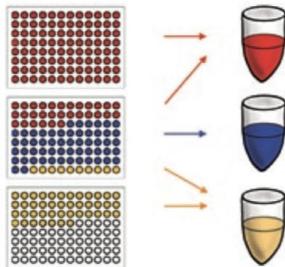
**Step 2:** design scaffold-staple layout, evaluate design and determine staple sequences



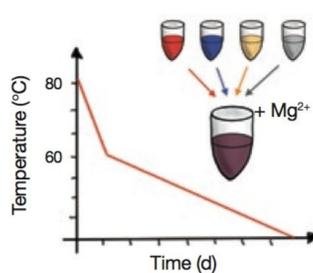
**Step 3:** prepare scaffold DNA and synthesize staple oligonucleotides



**Step 4:** pool staple oligonucleotides



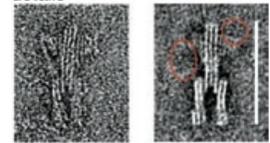
**Step 5:** run molecular self-assembly reactions



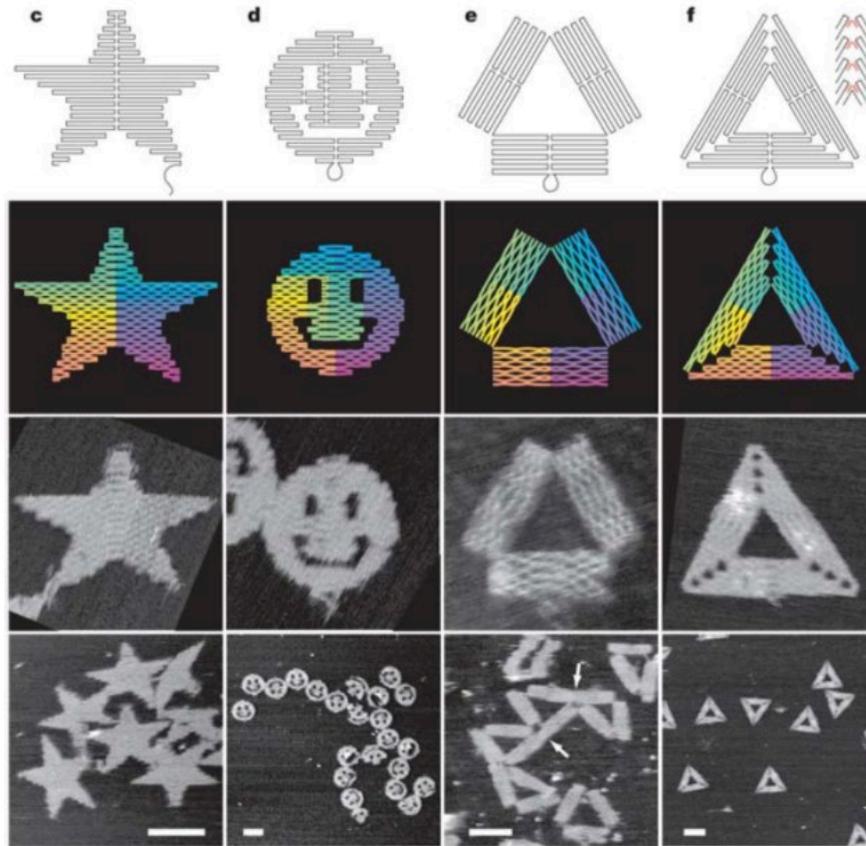
**Step 6:** analyze folding quality and purify



**Step 7:** analyze structural details



- **Challenge Question:** Who remembers the original DNA Origami structures from Charlie’s slides?
  - **Answer:** Star, Smiley Face, Triangle, and Triangle Made from 3 Rectangular Shapes Put Together



- Notice how easily the structures fall apart! How can you make them more stable?
- **Challenge Activity:** Try to make the following:
  - Tweezers
  - Box
  - Rainbow
  - Circle
  - Coffee Cup
  - Smiley Face