

Microscale

Mass Production at the Microscale


Each of the letters in the photo shown below are about four microns wide, or roughly one-tenth the width of a human hair. Shimmering with a fluorescent glow, the letters—actually particles in the shapes of the entire alphabet that were produced by the billions in the laboratory of Thomas G. Mason—were created using a process that demonstrates the power of a new method to make precisely-designed, highly-uniform shapes at the microscale.

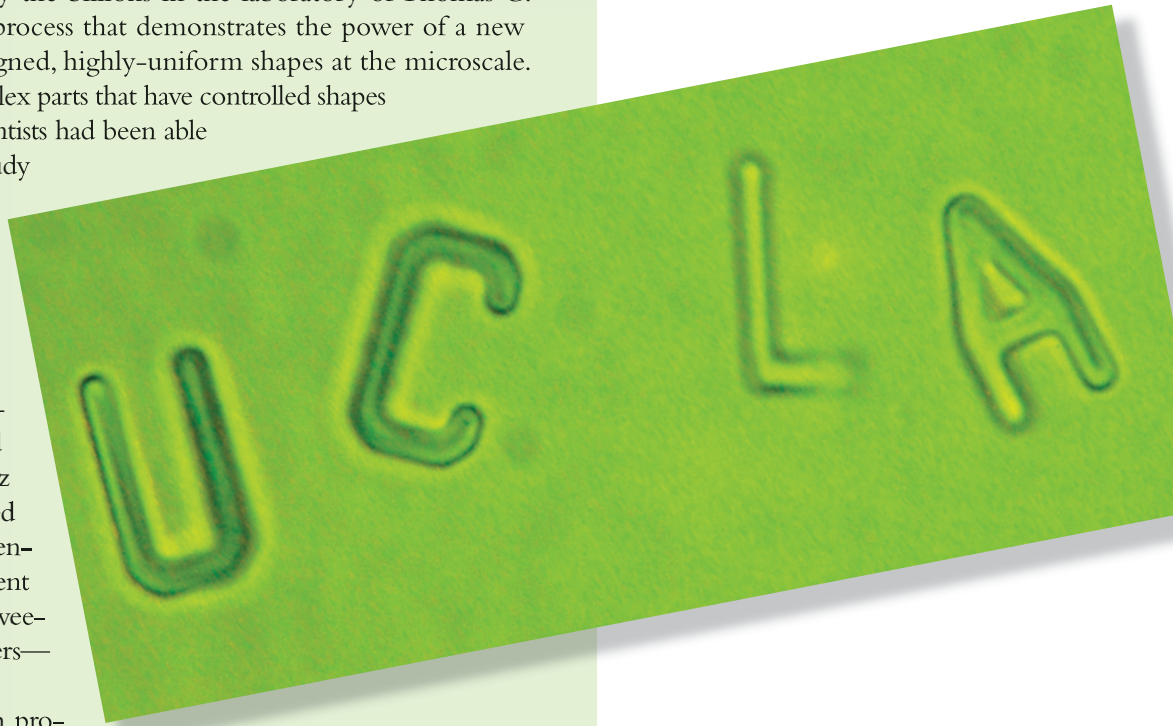
“We can mass-produce complex parts that have controlled shapes at a scale much smaller than scientists had been able to produce,” said Mason, the study co-author and an associate professor of chemistry who holds the UCLA John McTague Career Development Chair.

Carlos J. Hernandez, lead author of the study and a UCLA chemistry graduate student, designed a customized font and produced the letters. Hernandez and Mason have also produced triangles, crosses and three-dimensional shapes. Graduate student James N. Wilking used laser tweezers to grab and move the letters—spelling “UCLA.”

The research process, which produces particles shaped like letters that are suspended in solution, is funded in part by the National Science Foundation. The particles can be downsized even further into shapes that are 100 times to 1000 times smaller than the width of a human hair. In this process is potential for functional devices at the nanoscale (one-billionth of a meter), such as chemical markers, tiny pumps, motors or containers that could have applications in medicine or industry. “We have a high degree of control over the parts that we make and are on the verge of making functional devices,” said Mason, also a member of the UCLA California NanoSystems Institute.

The success of the process creates a whole new list of research questions.

“How can we control and direct the assembly of tiny components to make a machine that works?” Mason asked. “Can we cause the components to fit together in a controlled way that may be useful to us? Can we create useful complex structures out of fundamental parts, in solution, where we can mass-produce a small-scale engine, for example? We will pursue these research questions.” 



A new process demonstrates the power of a method to produce precisely-designed, highly-uniform shapes at the microscale—and smaller.

www.chem.ucla.edu/dept/Faculty/Mason

www.college.ucla.edu/report/vol6_thomas-mason.pdf