

Complex channels churn up fluids.



MIGHTY MICROMIXER

To make medical devices that analyze tiny amounts of fluid, researchers are building biochips with increasingly complex patterns of channels. At the University of Illinois at Urbana-Champaign, materials scientist Jennifer Lewis and structural engineer Scott White have developed three-dimensional networks of channels that make fluids flow in ways that today's flat wafers can only dream of. The technology could yield chips for DNA and blood analysis able to handle more complex tasks, circulatory networks that pump chemical glues through self-healing materials, and even tiny but sophisticated chemical reactors. The new biochip's geometry—channels 10 to 300 micrometers in diameter that look like interconnected square spiral staircases—allows it to mix and process fluids in much less space than current planar chips. To fabricate the chips, a syringe dispenses 16 layers of a special "ink" in staircase patterns across a substrate layer of Teflon. The resulting structure is then coated with resin and heated; the heat melts the ink so it can be vacuumed away, leaving a network of channels that are modified to form mixing towers. The researchers have filed a patent on the technology.