



**I**n electroplating, process control is crucial—particularly when electrodepositing small electronic and microelectromechanical devices. Process control is difficult to maintain when the feature size of these devices shrinks below the thickness of the static boundary layer that envelops the substrate being plated. Variations in bulk chemistry and fluid flow are ineffective. Here is a product that allows electroplaters to regain process control.



## FIBRoplate™ IKo™

**How It Helps:** The FIBRoplate IKo electroplating system allows electroplaters to manage the boundary layer thickness. By agitating the electrolyte solution around the features, the boundary layer can be reduced by up to 90 percent, which allows greater process control. Compared to its nearest competitor, the system is 25 percent smaller—it is the smallest electroplater footprint on the market—and consumes 75 percent less electroplating solution.

**How It Works:** FIBRoplate IKo uses unique fibrillic applicators, or brushes, to agitate the electrolyte solution around the features without damaging them. These soft applicators are positioned 5 to 10 microns from the surface. When in motion, they cause circulation of the electrolytic solution near the substrate. This effectively reduces the boundary layer thickness and enables process control. Bulk chemistry and fluid flow can still be used to affect the plating results; however, a new level of process control can be achieved by varying the motion of the applicators.

**How Much It Will Cost:** The base price for the FIBRoplate IKo is \$30,000. This cost is about half that of its nearest competitor.



**When It Will Be Ready:** The electroplating system is available now. Bench-top electroplaters for microelectromechanical and nanoelectromechanical applications have been sold to universities and research institutions.

**Who Is Working On It:** The innovator is ElectroChemical Systems, Inc. (ECSI). ECSI was founded in 1989 by Dr. Igor Kadija. The company focuses on designing, building, and supplying practical, precise wet-processing equipment for micromachining and microelectronics R&D and manufacturing. It retains three subcontractors with expertise in machining, plastics, and electronics design. It occupies a 1,000-square-foot facility in Denville, New Jersey with quality control, wet processing, and bench-top testing capabilities. For more information, contact Igor Kadija of ECSI at (201) 670-8397 or ikadija@fibrotools.com. The company Web site is [www.fibrotools.com](http://www.fibrotools.com).






**MDA Origins**

ECSI was awarded two BMDO SBIR contracts. In 1992 under a Phase I contract, the company demonstrated the electroplating applications of this technology by making copper interconnects on silicon. In 1993, under a Phase II contract, it started building an etching system based on the technology. However, because the cost of developing the etcher proved too high, ECSI returned to the plating application and completed a prototype. Ideally, BMDO could use this technology to create reliable, high-density interconnects for space weapons.

