

## **Current Status and Future Direction of Microfabricated Semiconductor Arrays for Biotechnology Applications**

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Using a combination of semiconductor microelectronics and electrochemical control of nanoscale molecular assembly, Combimatrix has developed a system for synthesizing large libraries of organic compounds and polymers on microfabricated arrays. Combimatrix has applied DNA phosphoramidite chemistries to specially modified CMOS devices to control the electrochemical synthesis of large numbers of oligonucleotides for hybridization analysis and to produce libraries of customized nucleic acids for genetic screens. In addition, because the underlying substrate is a semiconductor rather than a passive glass surface, it has also been possible to develop novel molecular diagnostics by dispensing with established optical imaging approaches and using highly sensitive electrochemical approaches. We describe the technical challenges involved in development and present 'real-world' examples of the commercial utility of this convergent technology in DNA microarray applications, drug discovery, bio-defense and diagnostics development.