

Testing Bio-chips

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Abstract

Dependability is an essential attribute for microfluidic biochips that are being developed for safety-critical applications such as point-of-care health assessment, air-quality monitoring, and food-safety testing. Therefore, these devices must be adequately tested after manufacture and during bioassay operations. This paper describes testing and diagnosis techniques for droplet-based "digital" microfluidic biochips. Defects are related to logical fault models that can be viewed not only in terms of traditional shorts and opens, but which also target fluidic malfunctions and overall biochip functionality. Based on these fault models, test techniques for biochips and digital microfluidic modules are presented. Finally, built-in self-test methods using microfluidic logic gates are described. These emerging test techniques are expected to facilitate the deployment and use of fault-tolerant biochips for clinical diagnostics and laboratory applications.