

Public Abstract

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Title:Long-term Reliable Contactless Bio-fluids Delivery with Clog-free Microfluidic Ejector Using Liquid-film-embedded Valve

Missing lines in printed text and images are very familiar telltale signs of a malfunctioning inkjet printer cartridge. Clogged printhead nozzles are often the cause of such failure. The various factors that contribute to printhead clogging are thoroughly investigated and possible solutions are studied. Often, rapid evaporation at the microscopic scale seriously affects the nozzles causing them to dry out and clog. As can be learned from the human eye, a thin oily liquid film layer protects the underlying aqueous layer on the eyeball and prevents it from drying out. This same idea has been applied to protect the nozzles of an inkjet cartridge from drying out. By employing a thin oily film over the printhead nozzles, clogging has been successfully prevented. Using this technique, the nozzles have continuously remained in a fresh state over extended periods of time. Furthermore, we have implemented this anti-clogging mechanism to improve tissue printing quality for tissue engineering applications. In addition, we have developed special oil-repellent and slippery surfaces to handle the thin oil film effectively.