A fluid microconnector seal for packaging applications

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Abstract
An elastic seal was developed for fluid microconnectors. The seal can accommodate a variety of tube configurations including multiple tubes, inline connections and package bulkhead connections. The seal is polydimethylsiloxane (PDMS) cast into mechanically micromachined molds and it seals by an interference fit with an inserted rigid tube. Seals designed for various pressures were fabricated and tested for leakage and internal wear due to repeated insertions of a tube. It was found that properly designed and fabricated seals did not leak after 70 insertion and removal cycles of the tube. The seals experienced a rapid initial wear but the rate of wear greatly reduced after many insertions. If this is accounted for in the design and operation of a connector, the seals provide a reliable solution for microsystem packages where fluid connections must be broken and re-established without moving parts, tools or outside energy sources.