NISTTech

Magnetic Connectors for Microfluidic Applications

A leak-proof, reuseable connection between macro and microfluidic devices

Description

Microfluidics is a rapidly expanding area that encompasses such technologies as lab-on-a-chip and ink-jet printheads. Very tiny flows of liquids are controlled and manipulated using a variety of devices. Because the microfluidic scale is so small, measured in the sub-millimeter scale comparable to the thickness of a human hair, its applications provide significant savings of energy, chemicals, time and space. A common microfluidics problem is how to connect the tiny applications to other, macro-sized devices such as tubing and larger fixtures. Researchers at the National Institute of Standards and Technology (NIST) solved this problem by creating a leak-proof, reuseable connection between macro and microfluidic devices. Piping is attached to a tube-shaped magnet which is placed over an inlet or outlet hole in a microfluidic device. An O-shaped gasket seals the connection between the piping, magnetic tube and the device. A second magnet is placed on the other side of the microfluidic device to tightly hold the tube and device together. Fluids or gases may be added or removed through the tubing. The connector seal did not leak under fluid pressures of 100 psi. Using other magnetic shaped objects may be designed to control flows. For example, magnets imbedded in Teflon pieces form multiconnector valves to turn on or off fluid flows. Each assembly has a tunnel that can be magnetically twisted open to line up with the microfluidic device or closed to block the flow. Microfluidic magnetic connectors can safely be used and reused with nearly any chemical application except for those with magnetic properties such as iron. Care must be taken to avoid magnetic interactions with other tools or equipment in close proximity.

Applications

- **Microfluidics**
  Easy and inexpensive connection from macro- to microfluidic applications

Advantages

- **Low cost and reusable**
  Standard sizes and interchangeability make the set up and reuse very inexpensive
- **Versatile and simple to use**
  A variety of micro-flow control devices can be easily created using this concept

Abstract

NIST has patented a magnetic connector assembly for microfluidic devices. The connector serves as an interface between a microfluidic device to the macro setting, such as syringes or wells, in a manner that does not require adhesives or extra back-plates with screw connectors. The invention allows the use of microfludic devices for chemical analysis without the problems posed by adhesives.

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Related Items

- Novel NIST Connector Uses Magnets for Leak-Free Microfluidic Devices

Status of Availability

This invention is available for licensing exclusively or non-exclusively in any field of use.

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