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(54) **MICROFLUIDIC PLATFORM OF ARRAYED SWITCHABLE SPIN-VALVE ELEMENTS FOR HIGH-THROUGHPUT SORTING AND MANIPULATION OF MAGNETIC PARTICLES AND BIOMOLECULES**

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See application file for complete search history.

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(57) **ABSTRACT**

Arrays of spin-valve elements that can be selectively activated to trap, hold, manipulate and release magnetically tagged biological and chemical particles, including molecules and polymers. The spin-valve elements that can be selectively activated and deactivated by applying a momentary applied magnetic field thereto. The spin valve element array can be used for selectively sorting and transporting magnetic particles one particle at a time within the array. As the magnetically tagged particles are held by the spin-valve elements, application of an auxiliary magnetic field can be used to apply tension or torsion to the held particles or to move, e.g. rotate, the trapped particles. The arrays of spin-valve elements can be used in a variety of applications including drug screening, nucleic acid sequencing, structural control and analysis of RNA/DNA and proteins, medical diagnosis, and magnetic particle susceptibility and size homogenization for other medical applications.

**15 Claims, 8 Drawing Sheets**

