ricated by compression molding using Carver hydraulic laboratory presses (Carver, Inc., Wabash, Ind.). A Silicon (Si) stamper was used to transfer the channel patterns into the plastic. The Si stamper was fabricated using standard photolithographic procedures followed by an isotropic wet etching process. A mixture of hydrofluoric acid (HF), nitric acid (HNO_3), and acetic acid (CH_3COOH) in a ratio of 1:3:8, also referred as "HNA", is used as the etchant. The HNO_3 drives the oxidation of the silicon, while fluoride ions from HF then form the soluble silicon compound H_2SiF_6. The acetic acid, which is much less polar than water (smaller dielectric constant in the liquid state), helps prevent the dissociation of HNO_3 into NO_3^- or NO_2^-, thereby allowing the formation of the species directly responsible for the oxidation of silicon. The overall reaction is as follows:

$$18HF+4\ HNO_3+3Si \rightarrow 2\ H_2SiF_6+4NO+8\ H_2O$$

[0342] We used a thin layer of SiO_2 as a mask to etch Si. The etch rate of the Si using HNA etchant is ~1 μm/min. One parameter to note of this isotropic etching process associated with the Si etching rate is the dissolution of the reaction products into the solution. If the reaction products can be transported quickly into the solution and the fresh etchant solution can be replenished and moved into the etching area rapidly, the Si etching rate is high. Otherwise, the etching rate can be very slow. We utilize this mechanism to achieve different etch rates at different locations. The areas between channels (which are ridge structures as shown in **FIG. 7**, are larger than the areas of dome arrays (which are pit structures here). The solution can easily move in and out of the channel areas as compared to the smaller pit areas. As a result, the Si in the areas between channels is etched twice as fast as Si in the pit areas. The resulting ridge (channel) is 40 μm high, while the pits are 20 μm deep (see **FIGS. 13 and 14**). **FIGS. 13 and 14** show SEM images of pit structures of the isotropic etched Si stamper.

[0343] During the compression molding, a 5-mm-thick glass wafer was placed on the lower platen to provide a flat, smooth foundation surface. A 5-cm separation was established between the upper and lower platens. The silicon stamper was then placed on the glass wafer. The system was heated to 188° C. A predetermined amount of polycarbonate pellets (Aldrich) was placed in the center of the silicon stamper, and a blank nickel wafer was then placed on top of the,polycarbonate pellets. The upper platen was lowered into contact with the blank nickel wafer and was then gradually compressed against the polycarbonate pellets as they melted. When the formed polycarbonate layer reached 1 mm in thickness, the two hot plates were separated, and the polycarbonate wafer and silicon stamper assembly were removed from the hydraulic press to air cool for ninety seconds. After cooling, the molded chip was demolded from the silicon stamper and the blank nickel plate. The entire molding process took approximately three minutes. SEM images of a channel structure with micro-dome arrays obtained in compression molding process is shown in **FIGS. 15 and 16**. The channel is 40 μm deep, while the domes are 20 μm high.

[0344] Nickel-iron plating was accomplished as for the previous example. The resulting field gradients in a 0.3 T vertical field for the given example with a 100 μm thick plating can be expected to be around>1000 T/m near the tops of the domes.

We claim:

1. A microfluidic device comprising a solid support comprising:

a) a sample inlet port;

b) at least one microchannel comprising at least one section with walls comprising magnetic beads and an inner diameter devoid of said beads;

c) a sample outlet port.

2. A device according to claim 1 wherein said magnetic beads are embedded in said walls.

3. A device according to claim 1 wherein said magnetic beads are coated onto the inner surface of said walls.

4. A device according to claim 1 wherein said magnetic beads are of a uniform size.

5. A device according to claim 1 wherein said magnetic beads are of non-uniform size.

6. A device according to claims **1-5** wherein said magnetic beads are ferromagnetic.

7. A device according to claims **1-5** wherein said magnetic beads are permanently magnetized.

8. A device according to claims **1-5** wherein said magnetic beads are magnetized by electromagnet.

9. A device according to claim 1, further comprising a magnet that imparts magnetic property to the magnetic beads.

10. A device according to claim 1, further comprising a labeling chamber.

11. A device according to claim 1, further comprising a releasing chamber.

12. A device according to claim 1, further comprising a buffer inlet port.

13. A device according to claim 1, further comprising a waste outlet port.

14. A device according to claim 1, further comprising a detection module.

15. A device according to claim 14 wherein said detection module comprises:

a) a detection electrode;

b) a self-assembled monolayer;

c) a binding ligand;

d) a detection inlet port to receive said sample.

16. A device according to claim 1, further comprising a reagent storage well.

17. A device according to claim 1, further comprising a cell handling well.

18. A device according to claim 1, further comprising a reaction module.

19. A device according to claim 1, further comprising a separation module.

20. A device according to claim 1 further comprising a pump.

21. A device according to claim 1 further comprising a valve.

22. A microfluidic device comprising a solid support comprising:

a) a sample inlet port;

b) at least one microchannel comprising a gradient inducing feature coated with a magnetic material; and

c) a sample outlet port.