

Claims

1. A system, comprising:

an array comprising

a solid support having an exterior surface comprising a first set of wells interleaved with a second set of wells, the first set of wells comprises a repeating pattern of wells and the second set of wells comprises a repeating pattern of wells;

wherein the first set of wells are juxtaposed with the second set of wells,

the first set of wells each having a first bottom at a first elevation, z_1 , relative to the solid support,

the second set of wells each having a second bottom at a second elevation, z_2 , relative to the solid support;

wherein the height of the first elevation, z_1 , and the second elevation, z_2 , along the z axis is different;

and

wherein each well of the first set of wells and the second set of wells comprises attachment points for attaching analytes through direct or indirect bonding to the solid support, whereby the first wells are configured to attach analytes at a different elevation relative to analytes attached to the second set of wells; the system being **characterized in that** a pitch between a well of the first set of wells and each neighbouring well of the second set of wells in the array is less than 500 nm **and in that** the system further comprises

a waveguide selectively optically coupled to the first set of wells and not optically coupled to the second set of wells.

2. The system of claim 1, wherein each of the wells in the first set of wells and the second set of wells occupies an area that is smaller than $1\mu\text{m}^2$.

3. The system of claim 1, wherein the height difference between the first elevation, z_1 , and the second elevation, z_2 , along the z axis is greater than 2 μm .

4. The system of claim 1, wherein each well of the first set of wells and the second set of wells includes a material that is capable of attaching to an analyte.
5. The system of claim 1, wherein the first set of wells has the same lattice pattern as the second set of wells.
6. A method of detecting a plurality of analytes, comprising:
providing a waveguide and an array comprising a solid support having an exterior surface of the solid support comprising a first set of wells interleaved with a second set of wells wherein the first set of wells are juxtaposed with the second set of wells, the first set of wells comprises a repeating pattern of wells and the second set of wells comprises a repeating pattern of wells, the first set of wells each having a first bottom at a first elevation, z_1 , relative to the solid support, the second set of wells each having a second bottom at a second elevation, z_2 , relative to the solid support, the waveguide being selectively optically coupled to the first set of wells each having a first bottom at the first elevation z_1 and not optically coupled to the second set of wells,
detecting signals at the first elevation, z_1 , responsive to optically exciting analytes via the waveguide, whereby individual analyte features of the first set of wells are distinguished from each other; and
detecting signals at the second elevation, z_2 , whereby individual analyte features of the second set of wells are distinguished from each other,
wherein the height between the first elevation, z_1 , and the second elevation, z_2 , along the z axis is different, and wherein a pitch between the first set of wells and the second set of wells is less than 500 nm; and wherein each well of the first set of wells and the second set of wells comprises attachment points for attaching analytes through direct or indirect bonding to the solid support, whereby the first wells are configured to attach analytes at a different elevation relative to analytes attached to the second set of wells.