WHAT IS CLAIMED IS:

1. A system for manipulating a biological sample, comprising:

a punch device configured to form a sample portion of the biological sample, the punch device forming an internal cavity and having a bottom edge sufficiently sharp to cut through the biological sample;

a receiving substrate; and

a piston sized and shaped to fit within the internal cavity of the punch device, wherein the piston inserts into the internal cavity of the punch device to expel the sample portion from the punch device onto the receiving substrate.

2. The system of claim 1, wherein the receiving substrate comprises a functionalized glass surface or a functionalized plastic surface; or

the receiving substrate is a glass solid support.

3. The system of claim 2, wherein the receiving substrate further comprises a resist or

polylysine, poly(2-dimethylaminoethyl methacrylate) (PDMAEMA), chitosan, poly(amidoamine) (PAMAM), polyvinylamine (PVAm), or poly(allylamine hydrochloride) (PAH).

4. The system of claim 1, wherein the punch device comprises a top end and a bottom end, wherein said bottom end is distal to the top end and comprises the bottom edge, optionally

wherein a piston inserts into the bottom end of the punch device into the internal cavity of the punch device to expel the sample portion through the top end, and optionally

wherein the piston comprises a toroid seal.

5. The system of claim 4, wherein the diameter of the internal cavity at the top end is greater than the diameter of the internal cavity at the bottom end.

6. The system of claim 1, wherein the biological sample is a tissue section, optionally

wherein a thickness of the tissue section is about 1 μm to about 20 μm, or about 3 μm to about 10 μm, or about 5 μm to about 7 μm.

7. The system of claim 1, wherein the biological sample is attached to a carrier substrate forming the sample-carrier construct, wherein said carrier substrate comprises agarose, amylose, amylopectin, alginate, gelatin, cellulose, polyolefin, polyethylene glycol, polyvinyl alcohol, and/or acrylate polymers and copolymers thereof; or

wherein the biological sample is attached to a carrier substrate forming the sample-carrier construct, wherein said carrier substrate comprises agarose, agar, amylopectin, polyvinyl alcohol, Gellan gum, or alginate, optionally

wherein said punch device is configured to cut through the biological sample and the carrier substrate.

8. The system of claim 4, wherein the piston comprises a piston head, wherein the piston head is configured to contact the biological sample, optionally

wherein the diameter of the piston head is less than the diameter of the piston.

9. A system for manipulating a biological sample, comprising:

a punch device configured to form a sample portion of the biological sample, the punch device forming an internal cavity and having a bottom edge sufficiently sharp to cut through the biological sample;

a receiving array having a receptacle sized and shaped to receive at least a portion of the punch device;

a piston array having a piston sized and shaped to fit within the internal cavity of the punch device, wherein the piston inserts into the internal cavity of the punch device to expel the sample portion from the punch device into the at least one receptacle of the receiving array.

10. The system of claim9, wherein the receiving array includes a plurality of receptacles arranged in a first pattern; or

wherein the piston array includes a plurality of pistons arranged in a pattern that complements the first pattern such that the plurality of pistons can be inserted into the plurality of receptacles; or

wherein the punch device is cylindrical, square, or rectangular; or

wherein the bottom edge of the punch device is tapered to facilitate cutting, optionally

wherein the bottom edge of the punch device comprises a blade; or

wherein the sample biological sample is mounted on a carrier substrate, optionally

wherein the punch device is sufficiently sharp to cut through both the sample portion and the carrier substrate; or

wherein the punch device is configured to be positioned in the receptacle in the receiving array with the sample portion in the punch device; or

wherein the piston array comprises a base and a plurality of pistons extending from the base.

11. A receiving array comprising:

a plurality of receptacles arranged in a pattern, wherein each receptacle is configured to retain a punch device;

a plurality of punch devices, wherein each punch device comprises an internal cavity comprising a biological sample and a carrier substrate.

12. The receiving array of claim 11, wherein the receiving array comprises an identifying feature at each receptacle, wherein the identifying feature uniquely identifies the receptacle; or

wherein each punch device comprises an alignment feature configured to mate and align the punch device and receptacle in a proper orientation; or

wherein the receptacle and punch device are configured to haptic feedback when the punch device is retained in the receptacle; or wherein the punch device is retained in the receptacle using a snap-fit coupling.

13. A method of manipulating a biological sample, comprising:

cutting a sample portion from the biological sample using a punch device such that the punch device contains the sample portion;

mounting the punch device containing the sample portion into a receptacle of a receiving array, wherein the receiving array is removably attached to a solid support;

pushing the sample portion out of the punch device using a piston so that the sample portion is positioned on the solid support.

14. The method of claim 13, wherein cutting a sample portion comprises pressing a bottom edge of the punch device onto the biological sample so that the bottom edge cuts through the biological sample, optionally

wherein the sample portion remains inside an internal cavity of the punch device after the punch device cuts through the biological sample, and optionally

wherein the piston inserts through an internal cavity of the punch device as it pushes all or a portion of the sample portion out of the punch device.

15. The method of claim 13, further comprising removing the receiving array, piston, and punch device from the solid support; or

wherein the solid support comprises a functionalized glass surface or a functionalized plastic surface; or

wherein the solid support is a glass solid support; or

wherein the solid support further comprises a resist; or

wherein the solid support further comprises polylysine, poly(2-dimethylaminoethyl methacrylate) (PDMAEMA), chitosan, poly(amidoamine) (PAMAM), polyvinylamine (PVAm), or poly(allylamine hydrochloride) (PAH); or

wherein the solid support further comprises an anti-reflective coating; or

further comprising contacting the sample portion with a detection agent comprising a fluorophore, and detecting an emission from the fluorophore; or

further comprising contacting the sample portion with amplification reagents and amplifying a nucleic acid molecule in the sample portion.

16. A kit comprising

a punch device configured to form a sample portion of the biological sample, the punch device forming an internal cavity and having a bottom edge sufficiently sharp to cut through the biological sample; and

a piston sized and shaped to fit within the internal cavity of the punch device, wherein the piston inserts into the internal cavity of the punch device to expel the sample portion from the punch device.

17. A kit comprising the system of claim 4.