What is claimed is:

1. A cartridge for use with an instrument, the cartridge comprising:

digital microfluidics comprising a plurality of electrowetting electrodes operative to perform droplet operations on a liquid droplet in a droplet operations gap of the cartridge; and

a refractive index sensor exposed to the droplet operations gap in proximity with one or more of the electrowetting electrodes such that a droplet situated atop the one or more of the electrowetting electrodes will contact the refractive index sensor, an arrangement of the one or more of the electrowetting electrodes and the refractive index sensor establishing a droplet interrogation site.

2. The cartridge of claim 1 wherein the cartridges comprises a top plate and the refractive index sensor is mounted on a top plate.

3. The cartridge of claim 1 wherein the refractive index sensor is mounted in the droplet operations gap.

4. The cartridge of claim 1 wherein the droplet operations gap is established by a top plate and a bottom plate in substantially parallel planes, and wherein the refractive index sensor is mounted in the droplet operations gap and has a sensor face that is at a right angle to the substantially parallel planes.

5. The cartridge of any one of claims 1-4, wherein the refractive index sensor is provided as a tip of a waveguide.

6. The cartridge of any one of claims 1-5, further comprising X or more refractive index sensing channels, where $X \geq 2$.

7. The cartridge of any one of claims 1-6, further comprising X or more optical fibers, where $X \geq 2$.

8. The cartridge of any one of claims 1-5, further comprising X or more refractive index sensing channels, where $X \geq 10$.

9. The cartridge of any one of claims 1-5 or 8, further comprising X or more refractive index sensing channels, where $X \geq 50$.

10. The cartridge of any one of claims 1-9, further comprising a lens mounted opposite the refractive index sensor and droplet operations gap.

11. A system comprising:

a cartridge according to any one of claims 1-10; and

an instrument comprising electronics for controlling the cartridge and a means for mounting the cartridge to effect electronic coupling and control.

12. The system of claim 11, further comprising one or more illumination sources configured to illuminate the droplet interrogation site or sites.

13. The system of any one of claims 11-12, further comprising one or more optical measurement devices arranged to detect light from the droplet interrogation site or sites.

14. The system of any one of claims 11-13, further comprising an illumination source and an optical measurement device arranged with respect to a droplet interrogation site to operate in transmission mode and/or in reflection mode.

~~15. The system of any one of claims 11-14, further comprising an illumination source and an optical measurement device arranged with respect to a droplet interrogation site to operate in reflection mode.~~

~~16~~15. The system of any one of claims 11-~~15~~14, further comprising a scanning optical measurement device configured to scan multiple droplet interrogation sites.

~~17~~16. The system of any one of claims 11-~~16~~15, wherein the illumination source is integrated into the cartridge.

~~18~~17. The system of any one of claims 11-~~17~~16, wherein the illumination source comprises a light-emitting diode integrated into the cartridge.

~~19~~18. The system of any one of claims 11-~~18~~17, wherein the illumination source comprises a coaxial illumination source.

~~20~~19. A method, comprising:

providing a system according to any one of claims 11~~-19~~18;

loading a sample droplet into the droplet operations gap;

conducting one or more sample processing steps on the sample droplet to yield an analysis-ready droplet; and

conducting a refractive index analysis of analysis ready-droplet at a droplet interrogation site.

~~21~~20. The method of claim ~~20~~19 wherein one or more of the loading operation or the one or more sample processing steps is conducted using electrowetting-mediated droplet operations.