

67. Title: A membrane-less variable focus liquid lens and an imaging device

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Keywords: Liquid lens, Adaptive optics, Mechanical-wetting lens, Interface pinning

Domain: Smart Technologies

Summary: A tunable, membrane-less, mechanical-wetting liquid lens is developed which can be actuated manually using a linear actuator such as screw or piston. The operation of the liquid lens is based on deforming the interface separating two immiscible liquids with different refractive indices, while pinning the three-phase contact line at the sharp edge of lens aperture. The lens design improves upon the existing designs of mechanical-wetting lenses by eliminating the use of complex actuation mechanisms, without compromising on the optical performance. In the developed method, the focal length of the liquid lens is can be tuned repeatedly without any adverse effects of hysteresis and gravity.

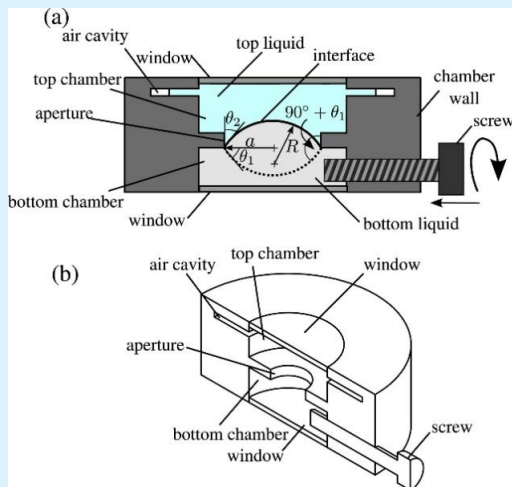


Figure: Schematic showing the design of the membrane-less, mechanical-wetting liquid lens.

Advantages:

- » The focal length of lens can be varied by varying the liquid-liquid interface curvature. This is unlike bulky lens assemblies of fixed focal length lenses, where the focal length is varied by varying the distance between the lenses.
- » Compact compared with variable focal lens assembly made of fixed-focal length lenses.
- » The liquid-liquid interface in the liquid lens is very smooth.
- » The lens design is robust, low-cost construction and requires no electrical power for actuation.
- » It eliminates complex actuation mechanisms.

Applications: Consumer Electronics

Scale of development: A functional prototype lens is developed and validated in simulated environment.

Technology Readiness Level: 5

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