



A drop of genius

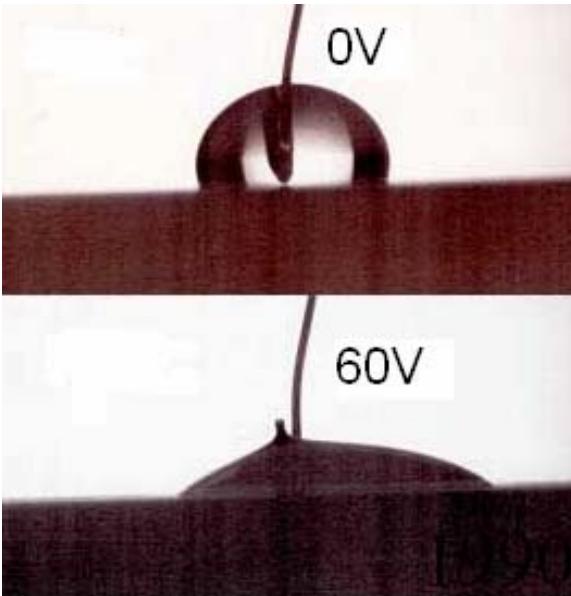
**A Drop of Genius for an  
Optical Revolution**



# Company Overview

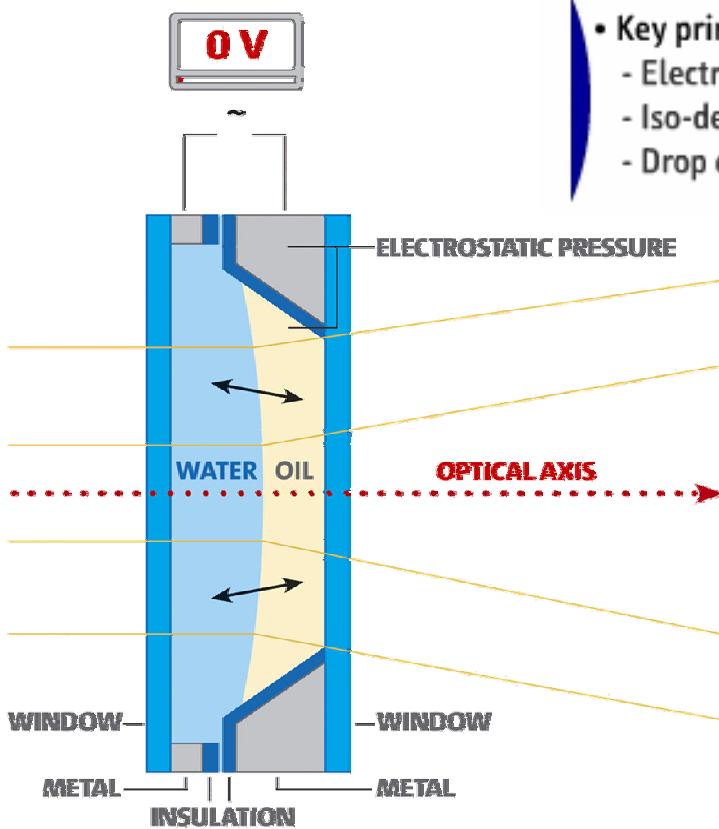
- Varioptic established in 2002 - based on 10 years of research
- Patents granted for fundamental liquid lens technology
- Based in Lyon, France
- 45 employees with 35 high level engineers and scientists in material science, optics, chemistry & mechanics
- Strong financial backing from Polytechnos (D), Sofinnova (F) and NIF (J)
- Samsung Electro-Mechanics is lead customer
- 12 other companies on Technology Assessment Programme
- In-house production line for low volume supply
- ISO9001 certification

# Electrowetting Principles

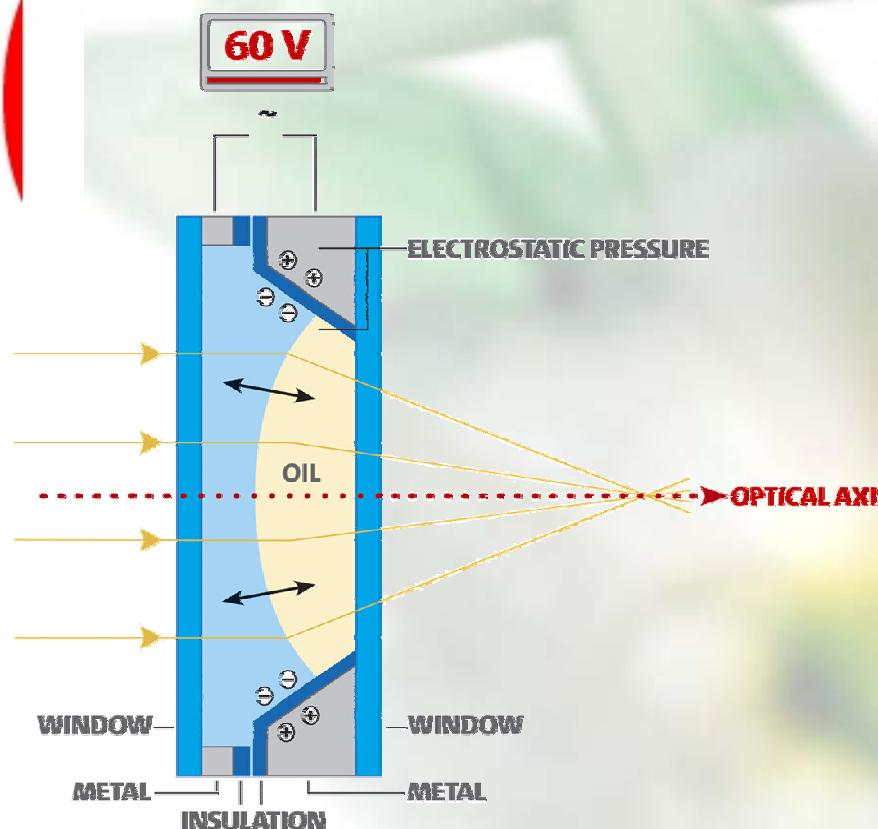


- **Liquid is “phobic” of the surface**
- **Increase voltage and the liquid increasingly “wets” the surface**

# Liquid Lens in Operation



- Key principles :
  - Electrowetting
  - Iso-density
  - Drop centering



- At low voltage the lens is slightly divergent

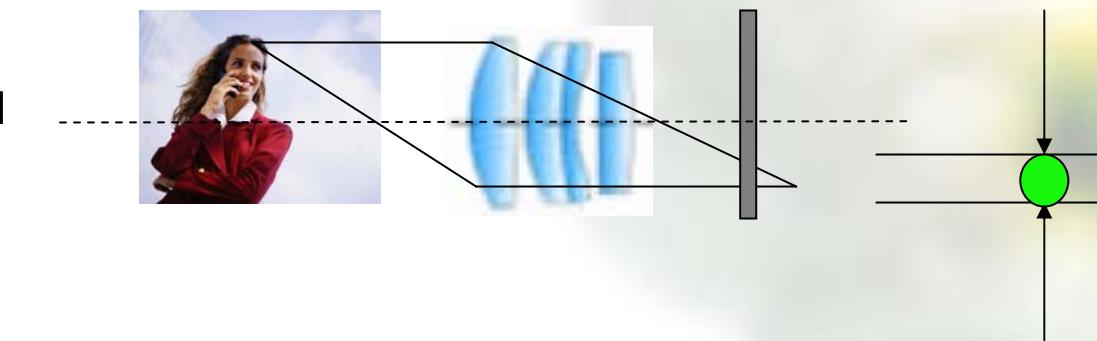
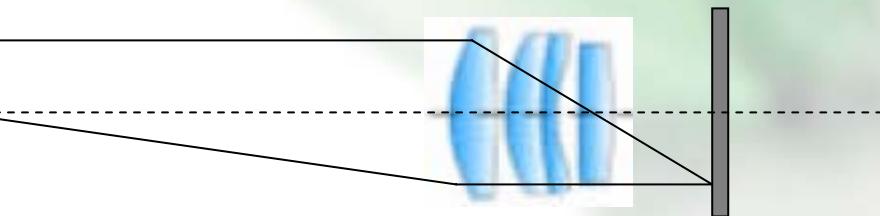
- Increase voltage and the lens power increases
- Range of -5 to +20 dioptres for launch product



# **“Focus” is essential for sensors with resolution > 1.3MP (1)**



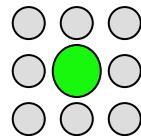
**Long distance focus is OK  
...but short range is blurred**



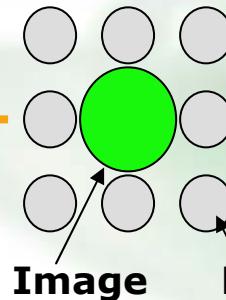
- **“Focus” point moves behind image plane**
- **At image plane, image is blurred if image size is larger than pixel size**



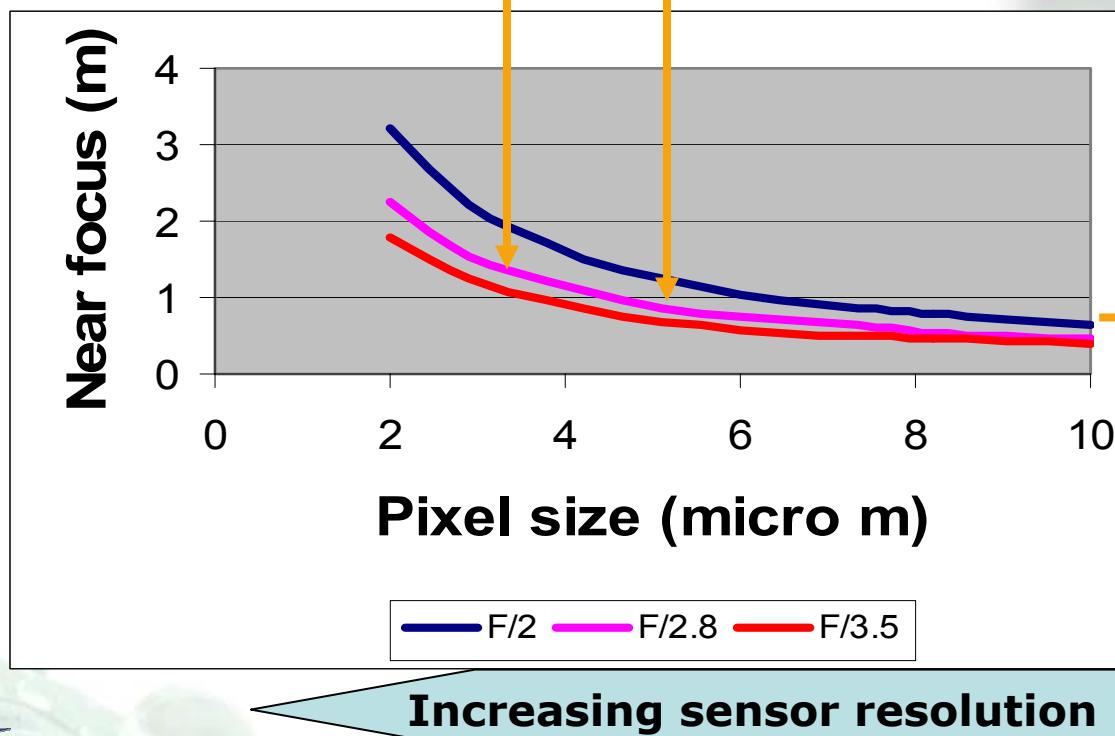
# “Focus” is essential for sensors with resolution > 1.3MP (2)



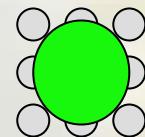
**(B2) 1.3MP sensor – image clear at 130cm or greater**



**(A) VGA sensor – clear image to 80cm for F/2.8 lens**



**BUT...**



**(B1) 1.3 MP sensor – image blurred at 80cm**

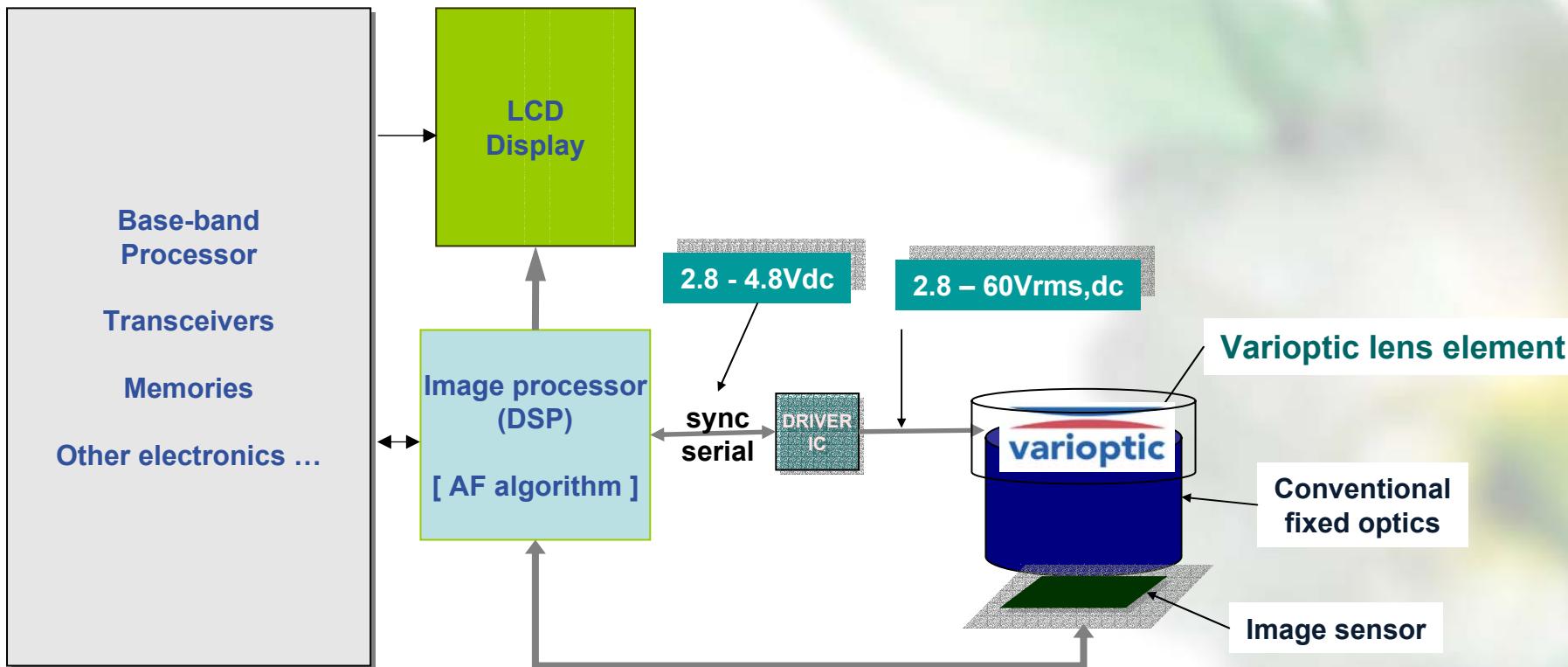
**Increasing sensor resolution**



# Markets For Auto-Focus & Zoom



# Auto-focus system





# The Problem : Poor image quality on camera-phones

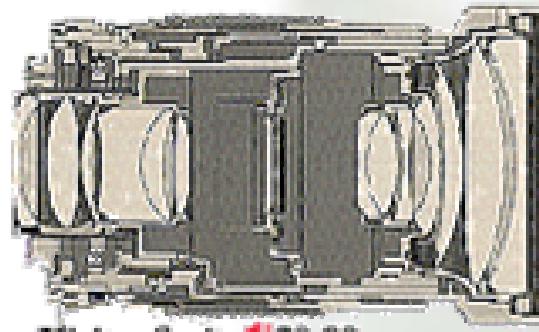
**CAMERA-PHONES ESSENTIALLY LACK AUTO-FOCUS (AF) OR ZOOM CAPABILITY.**

**/F AND ZOOM CURRENT TECHNOLOGIES ARE NOT COMPATIBLE WITH REQUIREMENTS OF MOBILE-PHONES.**

## **EXISTING SOLUTIONS:**

*Mechanical displacement of fixed lenses*

- Fragile and Complex
- Too big
- Require high power
- Expensive



# The Solution:

**VARIOPTIC TECHNOLOGY GETS RID OF ANY MOVING PART.  
THE LENS ITSELF ADJUSTS ITS FOCUS.**

- **Stronger:** Tested for more than 2 million ON-OFF cycles and 20 drop-tests 1.5 m.
- **Smaller:** 10.5 mm versus 12.5 mm and large possibilities of miniaturisation
- **Lower power:** 1mW versus 70 mW
- **Cheaper:** 0.5 € versus 2 € in volume production

