Optical immersion technology

In order to improve performance and get the best signal-to-noise ratio of the devices, optical immersion technology may be applied. It is successfully use in all types VIGO detectors.

Optical immersion it is monolithic integration of detector active element with hyperhemispherical microlens (deafult). It makes optical linear size of detector active area 11 times larger compared to its physical size. This results in improvement of detectivity D* by one order of magnitude. Also detector electric capacitance Cd is reduced by a factor of two orders of magnitude compared to conventional detector of the same optical area. Acceptance angle is reduced to ~36° – the microlens naturally shields background radiation which is one of the factors of noise. Hemispherical microlens is available as a custom option.

Optical power limitations for optically immersed detectors are more restrictive than for detectors without immersion microlens – for more information please see chapter Precautions for use.

Optically immersed detectors parameters

Parameter	Microlens shape			
	Hemisphere*)		Hyperhemisphere	
	Theory	GaAs	Theory	GaAs
Distance L	R	R	R·(n+1)	4.3·R
d / d'	n	3.3	n^2	10.9
D*imm / $D^*_{non\text{-}imm}$	n	3.3	n^2	10.9
Aceptance angle Φ	180°	180°	2arcsin(1/n)	~36°

*) Custom option

n – refractive index of microlens material (GaAs), n = 3.3

d – optical (apparent) detector size

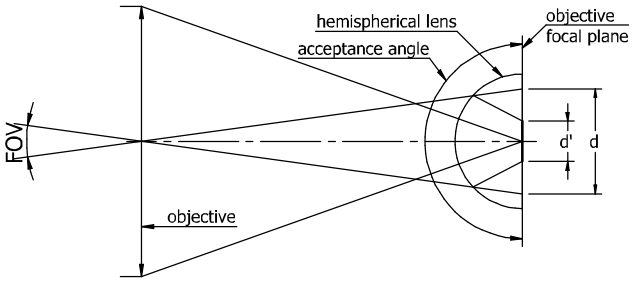
d' – physical detector size

R – lens radius

L – lens face to objective focal plane distance

h – lens thickness, h = R+ R/n

Function and properties of hemisphere microlens



Function and properties of hyperhemisphere microlens