

# ION-SELECTIVE OPTICAL FIBER

INO has developed an ion-selective fiber (ISF) for ion detection and concentration measurement. ISF technology is aimed at determination and monitoring of free ion concentrations in aqueous samples on a routine basis.

It is realized by depositing an ion-selective membrane as the fiber cladding. This membrane contains a dye indicator and an ion-selective ligand. The color (absorbance) of the membrane depends on the quantity of ions that migrated from the solution into the membrane and bound to the ligand.



Standard setup for ion measurement

## KEY APPLICATIONS

ISF technology is aimed at determination and monitoring of free ion concentrations in aqueous samples on a routine basis in:

- Several industries such as paper, oil and gas, agrifood,...
- Waste and waste water treatment
- Clinical labs

## ADVANTAGES

- Low cost and disposable probe
- Allow measurements in colored or opaque solution and in harsh environment
- No need for recalibration
- Custom tailored membrane compositions adjusting sensor response and lifetimes

INO IS VERY FLEXIBLE IN ITS OFFER

> PROTOTYPING    > SHORT RUN PRODUCTION    > TECHNOLOGICAL TRANSFER

# ION-SELECTIVE OPTICAL FIBER

INO's ion-selective fibers have been successfully tested for use in several solutions, and the selectivity of each optode has been demonstrated, as shown in the table below. INO's ion-selective optode consists of a PMMA fiber with a chemically-sensitive polymer membrane. The sensitive part of the fiber typically has a diameter of 400µm and a length of 10 cm.

## TYPICAL SPECIFICATIONS BY ION

I	K <sup>+</sup> (type 1)	K <sup>+</sup> (type 2)	NH <sub>4</sub> <sup>+</sup>	Na <sup>+</sup>	Ca <sup>2+</sup>	NO <sub>3</sub> <sup>-</sup>	
Calibration: concentration range							
log(C <sub>min</sub> ) M	-3.36	-5.07	-5.68	-4.96	-6.74	-4.49	
log(C <sub>max</sub> ) M	-1.16	-2.58	-2.88	-2.62	-2.05	-2.10	
σ	0.099	0.072	0.20	0.13	0.23	0.25	
C <sub>min</sub> , ppm	20	0.3	0.05	0.3	0.01	1.5	
C <sub>max</sub> , ppm	2700	100	25	55	360	365	
Response time	< 5 min	< 5 min	< 5 min	< 3 min	< 1 min	- 5 min	
Selective, log K <sub>I,J</sub>							
J							
K <sup>+</sup>	0.0	0.0	-1.2	-2.9	-4.1	H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>	-3.4
NH <sub>4</sub> <sup>+</sup>	-1.6	-2.5	0.0	-4.0	-4.1	Cl <sup>-</sup>	-2.0
Na <sup>+</sup>	-4.2	-3.5	-3.0	0.0	-4.1	SO <sub>4</sub> <sup>-</sup>	-3.4
Ca <sup>2+</sup>	-5.0	-4.3	-4.0	-3.9	0.0		
Li <sup>+</sup>	-5.0	-4.3	-5.0	-4.0	-3.3		
Mg <sup>2+</sup>				-3.7	-4.6		
Lifetime							
Discrete measurements (daily based)	~2 weeks	TBD	~2 weeks	~7 weeks	~5 weeks	2 days	

Note: pH optode is under development.

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CUSTOMIZABLE FOR YOUR NEEDS

AS A R&D COMPANY, INO CAN ADAPT OR DEVELOP  
OPTODES TO ANSWER YOUR NEEDS