Investigation on the sensing mechanism and feasibility of ITO based liquid sensor

OST. KMOU. [1], Major of Electronic Material Engineering. KMOU. [2], Div. of Offshore Plant Industries (KRISO) [3], Div. of Maritime Safety Research (KRISO) [4]

°Seok-hwan Lee[1], Jiho Chang[1,2*], Jung-Yeul Jung[3], Moonjin Lee[4]

E-mail: seokhwan-lee@kmou.ac.kr

We proposed a new liquid sensor by using an Indium Tin Oxide (ITO) for the detection of hazardous noxious substances (HNS). Porous ITO layer was formed on a quartz substrate by a simple printing method subsequently characterized by using X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM). Sensor characteristics were tested at room temperature without additional heating process.

The resistance change (δR) was linearly correlated with the NH_4OH concentration in the seawater solution as shown in the Fig. 1. The mechanism of sensor response has been discussed in terms of two reactions; one is the redox reaction, the other is the formation of electrical double layer (EDL) on the ITO layer surface. It revealed almost linear output signal up to the NH_4OH concentrations of 15%. Sensitivity of the sensor showed small temperature dependency (dS/dT=0.083 %/^oC) within 5~35^oC range. Both results imply that ITO is a good candidate for liquid HNS sensor. In addition to that, to specify the chemical exactly, we confirmed the response of the ITO layer along with the pH of the solution.

In summary, we have investigated on the sensing mechanism and the feasibility of ITO based liquid sensor for the application to HNS detection.

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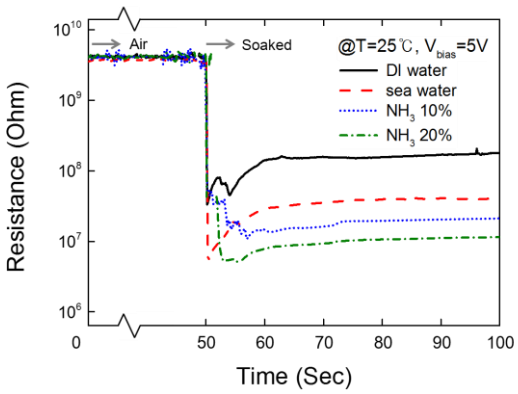

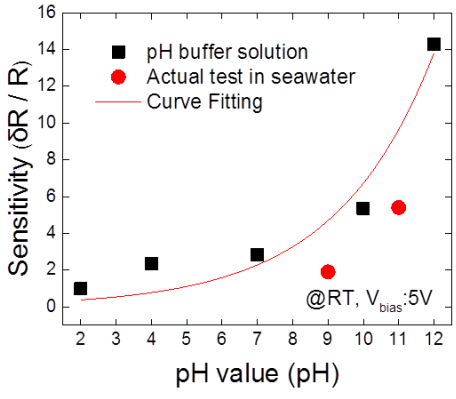

Fig 1. Time resolved resistance change of the ITO layers soaked in the various liquids. (Left)

Fig 2. Sensitivity change of the ITO layers soaked in the various pH liquids. (Right)