Al/ZnO nanorods-based microcantilever sensor for high sensitivity CO detection

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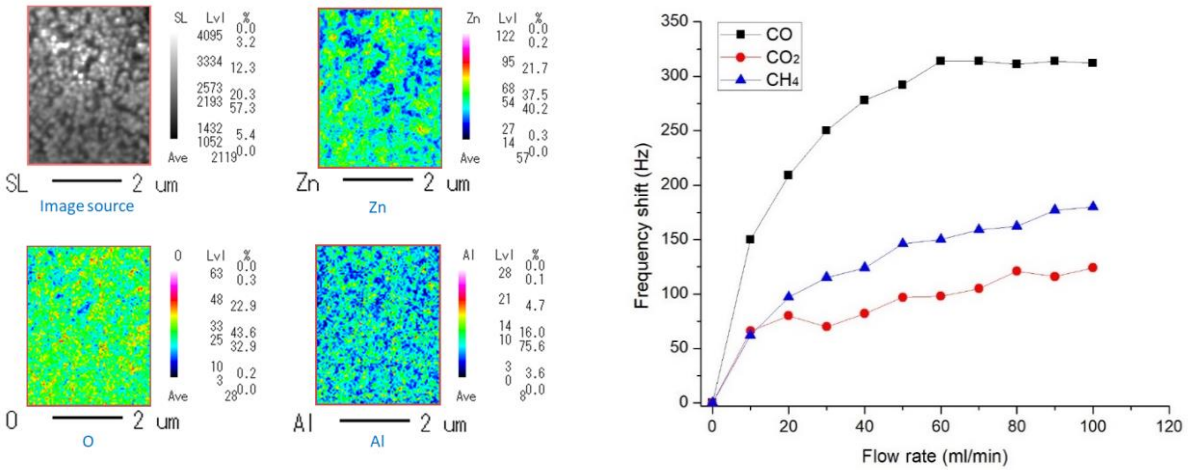
Microcantilever is prospective to be applied as a gas sensor at room temperature. In this work, zinc oxide nanorods (ZnO NRs) was coated on the microcantilever as a sensitive layer for CO detection. To increase sensing response, aluminium (Al) atom was doped on ZnO NRs-coated microcantilever (AZNMC) by sputtering technique. Figure **1(a)** shows electron probe microanalyzer (EPMA) micrograph of AZNMC. High concentration of Al arised where the ZnO NRs exist, which indicated that Al was selectively combined with crystal structure of NRs. The sensing property was investigated by measuring resonance frequency profile of the vibrating microcantilever in varied gas concentration. In addition, the highest sensitivity was obtained for CO gas compared to the other gases, i.e., CO_2 and CH_4, as shown in Fig. **1(b)**. The CO gas sensing response in femto-gram order was observed. The presence of Al atoms in ZnO NRs generates strong interaction between CO and Al-doped ZnO NRs enhancing the sensitivity to CO. This result opens the possibility of AZNMC to be applied as highly sensitive CO sensor.

Keywords: microcantilever, ZnO nanorods, Al doping, CO detection.



(a) (b)

Fig. **1(a)** EPMA result for distribution of Al on the ZnO NRs, **(b)** Frequency shift of AZNMC due to gasses of CO, CO_2, and CH_4 with flow rate of 10 - 100 ml/min.