**Keynote or Invited speaker #**

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**Title of Your Extended Abstract for 15th ACCS Kitakyushu (Arial Bold 14pt centered)**

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(*Arial Italic 10pt*)

Abstract should not exceed **1 page**. A short abstract may be provided which summarizes the content of your paper. The abstract should be in text only. However, you may add figures and/or tables, but please be sure to keep it within one page. Upper, bottom, left and right margins are 25 mm. Font: **Arial 10pt,** justified.

Note: This abstract will also be posted on the 15ACCS website as an electronic file.

One promising sensor material is zeolite, which has molecular-sized pores and solid activity. Also, zeolites have ion exchange properties, which change surface electric state and solid acidity. Based on the idea that controlling acidity by ion exchange is effective for carbon dioxide response. In this study, ion-exchanged zeolites were used as the receptor, and a sensor was constructed to detect the change in charge state due to gas adsorption on the zeolite as a change in impedance of the solid electrolyte [1].

The solid electrolyte was synthesized by a wet process. Aqueous metal nitrate solutions of stoichiometric composition were evaporated, dried, sintered, and the resulting powders were formed into tablets and sintered at 1050ºC [2]. The ion-exchanged metal ions were immersed in aqueous solutions of various metal chlorides, filtered, and sintered at 600ºC. Each sample was analyzed by XRD, SEM, TPD, BET, etc. The receptor was made by screen printing each powder onto a solid electrolyte and sintered at 500ºC. A gold electrode was formed on the opposite side of the disc to form the sensor element. The sensor response was measured by circulating synthetic dry air and test gases of various concentrations at temperatures ranging from 300 °C to 500 °C and frequencies at around 50 Hz. The resistance and capacitance changes of the element were measured with an AC impedance meter.

SAMPLE

Responses of resistance and capacitance components of Ca2+ zeolite-based devices to CO2 at 400ºC, with increasing resistance and decreasing capacitance responses to CO2 at 400ºC. The Rb, Mg, and Sr-based zeolites showed almost no response to CO2. The response of the Ca2+ type zeolite element to CO2 of the device was in the opposite direction compared to the responses to CO, NO, and NO2 gases, suggesting that this sensor may be able to distinguish between gas species by the direction of response.

The sensor was constructed using zeolite and solid electrolyte. The Ca- zeolite based device was found to respond selectively to CO2.

**Keywords:** Zeolite; Solid electrolyte; CO2 sensor; Impedancemetric

[1] Y. Shimizu, H. Nakano, S. Takase, J.-H. Song, *Sensors & Actuators B,* **264**, 177-183 (2018).

[2] S. Takase, K. Nakashima, M. Arima, K. Terada, Y. Shimizu, *Solid State Ionics*, **64** (2021) 115607.

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