担当企業：オムロン㈱
OMRON Corporation

イオン液体のCO_2吸着を用いた低消費電力CO_2濃度センサの開発

Development of Low Power Consumption CO_2 Sensor Using CO_2 Adsorption of Ionic Liquid

研究のポイント： Point

■CO_2を特異的に吸着したイオン液体にインピーダンスでCO_2濃度を換算したCO_2センサを開発。また固体化(ゲル化)導入により，加工性および耐久UP！
◆特徴　・光源やヒーター用いない　・イオンの応答性を利用。
■従来のCO_2センサと比べ　① 低消費電力 ② 小型化 ③ 高速応答 ④ 低コストを実現

■We develop CO_2 sensor which converted CO_2 concentration into the ionic liquid which adsorbed CO_2 specifically by impedance. And we expect compatible and durability to make gelation of the ionic liquids.
◆Feature ・not using light source and heater ・using ionic response
■It compares with conventional CO_2 sensor,
①low power consumption ②miniaturization ③high speed response ④low cost

背景と目的： Background & Purpose

■ビル管理法など、オフィスビル、生産工場、IT関連のサーバールームなどの空間におけるCO_2濃度を1000ppm以下に抑制が必要。
(現状、CO_2濃度を一定値以下にするために、定期的に強制的な排気)
CO_2センサを用いて、空調管理している空気の排気量を最小化することで、空調システムの効率的稼動し、センサネットワークシステムに効率よく連動する低消費電力高集積化対応CO_2センサの開発を目的とする。

■Control is required for 1000 ppm or less in CO_2 concentration in space, such as office buildings, such as a building management method, a production plant, and an IT-related server room.
An exhaust gas periodically compulsory in order to make the present condition and CO_2 concentration below into a steady value.
By minimizing the displacement volume of the air which is carrying out air-conditioning management using CO_2 sensor, an air-conditioning system carries out efficient operation, and it aims at development of CO_2 sensor corresponding to low power consumption high integration interlocked with a sensor network system efficiently.

研究の内容： Summary

- 消費電力が非常に低い
- CO_2濃度依存性が良好
- 100ppmクラスの高分解能

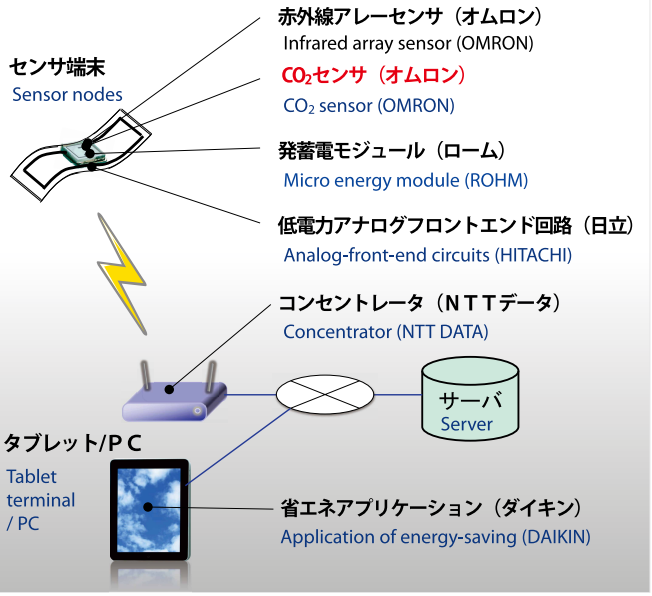
- Low power consumption is very low.
- CO_2 concentration dependence is good.
- High resolution of a 100 ppm class.

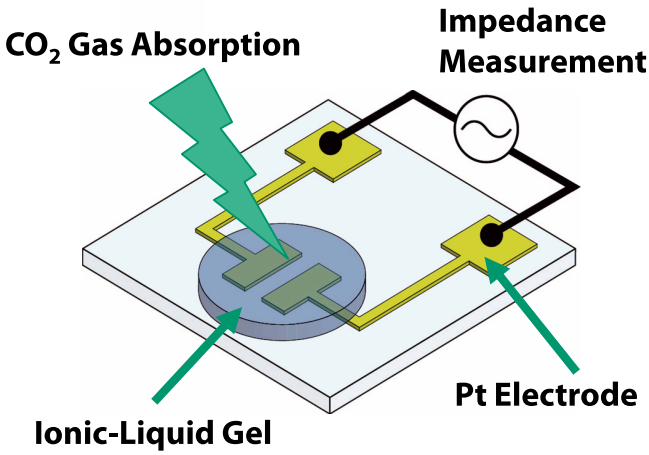
ネットワーク・応用分野：Network・Application Areas

■通信・制御・センサの共有化を図り、オフィスや工場、家庭における空調を含む全体の消費エネルギーの低減化、エネルギー管理。人の有無、部屋の内部にある装置の可動状況などを把握し、最小限のエネルギーで、空間全体の省エネルギー化が可能。

■Reductionizing of the consumption energy of the whole which attains sharing of communication, control, and a sensor, and includes air-conditioning in an office, a factory, and a home, energy management. The movable situation of the equipment in people's existence and the inside of the room, etc. are grasped, and energy saving of the whole space is possible with the minimum energy.

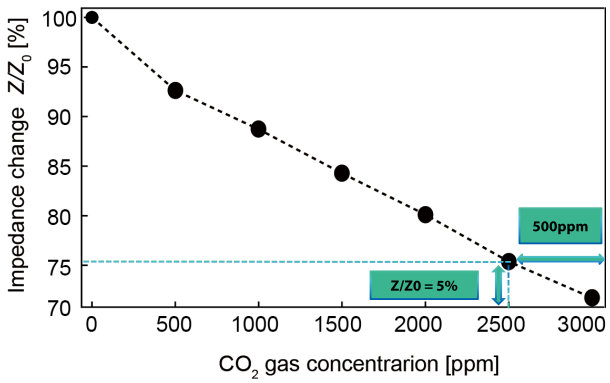
グリーンセンサネットワークシステム例（スマートオフィス）
Green sensor network system (smart office)





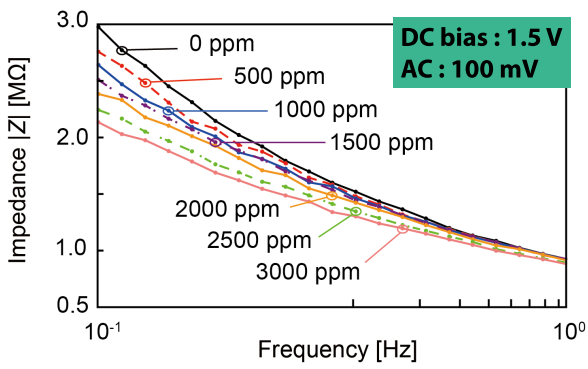
Ionic-Liquid Gel
・Compatible with MEMS process
・High durability

Impedance measurement of the ionic liquid changing the CO_2 concentration



0.97 % Impedance change / 100 ppm CO_2 were observed.

CO_2 concentration dependence of Impedance of the ionic liquid



Impedance decreases according to the increase of the CO_2 concentration.