

37 - 31 Manipulation of metal dispersions inside glass by adjusting potential distributions using ion-conducting microelectrodes

物質生命化学科	助 手	鎌 田 海
大学院自然科学研究科	前期課程	山 下 周 一
	教 授	松 本 泰 道

Electrochemical control of metal distributions inside glass, containing alkali ions as mobile species, was accomplished using two types of ion- conducting electrodes, a planar electrode and a microelectrode. The fundamental solid- state electrochemical cell consists of a [anode/M⁺ conductor (M = Ag, Li, Na)/glass/ Na- beta"- Al₂O₃/cathode] sandwich system. In this cell, M⁺ was substituted for alkali ions in the glass under the effects of an electric field. The contact areas of the anodic and/ or cathodic surface of the glass directly affected the potential distribution inside the glass. As a result, various dopant distributions could be constructed near the glass surface. Furthermore, we have achieved the design and tailoring of three- dimensional metal distributions in the glass using a two- step doping technique. Specifically, the dopant dispersion included on the glass surface in advance could then be encapsulated within the glass by subsequent cation injection.

(Journal of the Electrochemical Society, Vol. 151, No. 5, pp. J33-J37, (2004).)