102 學年

材 料 工 程 系 專 題 製 作 成 果 報 告

題　　目：連續式合成銀參雜介孔生物活性玻璃之生物性與抗菌性研究
Bioactivity and Antibacterial Properties of One-step Synthesized Silver Doped Mesoporous Bioactive Glass

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簡介

Bioactive glass (BG) is a material that can form strong chemical bonds with bone tissues because of the hydroxyapatite (HA) layers that will formed on the surface of bioactive glass when it is implanted in a human body. In order to achieve higher bioactivity, one of the strategies is to increase the specific surface area of bioactive glass by synthesize mesoporous bioactive glass (MBG). Therefore, the improvements in the mesoporous bioactive glass properties by added antibacterial functions are needed to overcome the problems. Mesoporous bioactive glass that has antibacterial properties can be achieved by doped the mesoporous bioactive glass with antibacterial agents.

儀器設備

X-ray Diffraction(XRD)

Nitrogen Adsorption /desorption(BET)

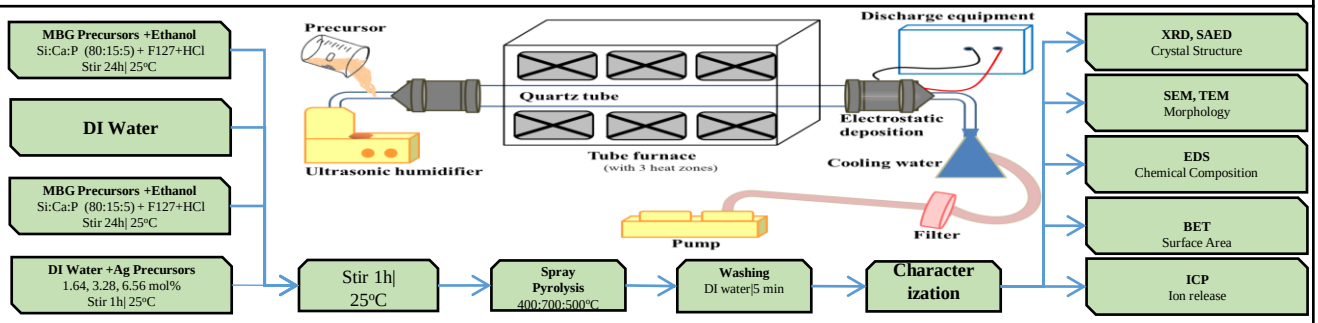
Scanning Electron Microscope(SEM)

Transmission Electron Microscope(TEM)

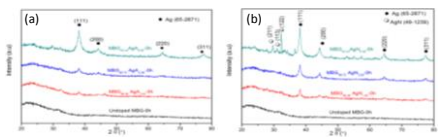
Induction Couple Plasma(ICP)

Thermograimetric analysis (TGA)

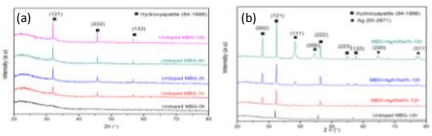
實驗步驟

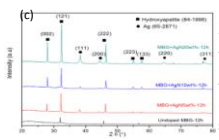


研究成果

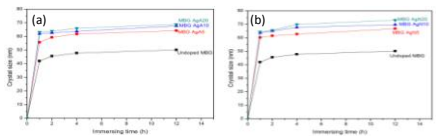


XRD patterns of undoped MBG and Ag-doped MBG prepared using (a) AgA precursor and (b) AgN.

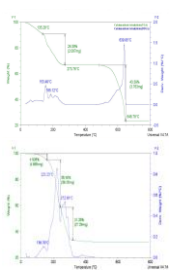




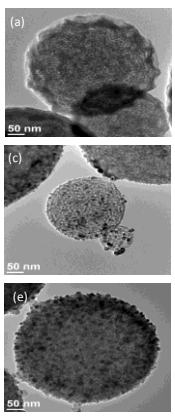
XRD peak of (a) undoped and Ag-doped MBG prepared using (b)AgA and (c)AgN precursor with various concentrations before (0h) and after immersed in SBF solution for 2, 4, and 12h

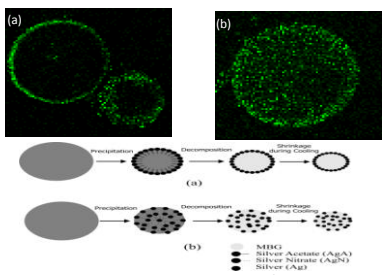


Crystallite size of HA based on the XRD of Ag-doped Ag-doped MBG prepared using (a) AgA and (b) AgN soaked in SBF for 1, 2, 4 and 12h

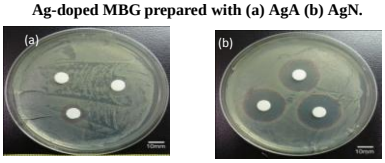


The TGA curve of precursors (a)CaO_2,(b)TEOS,(c)TEP.The TGA data will shows weight change under atmosphere

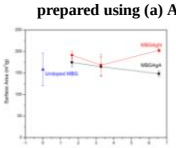




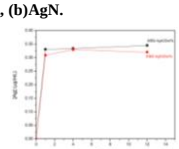
XEDS Elemental mapping of Ag-Kβ 6.56 mol% Ag-doped MBG prepared with (a) AgA (b) AgN.



Antibacterial test of 6.56 mol% Ag-doped MBG prepared using (a) AgA, (b)AgN.



Specific surface area of undoped and Ag-dopedMBG with various concentrations



Ag Dissolution profiles (fromICP) of 6.56 mol% Ag-doped MBG from AgA and AgN

結論

1.The silver-doped MBG (Si-Ca-P mesoporous bioactive glass) is successfully synthesized bu using SP: that this process to synthesized silver-doped MBG is not yet be found before.
2.The distributions of sliver doped are determined by the solubility of the silver precursor that is used on the process. The Ag doped distributions of AgAcase is on the surface and for AgN case is distributed homogeneously within the particles.
3.Silver content in the mesoporous bioactive glass does not inhibit but supposed to enhance the hydroxyapatite formation (bioactivity) of the mesoporous bioactive glass.