

Fabrication of Gold Nanoparticle / Silica Composite Aerogel via Spontaneous Nanocomposite Formation

Yutaka TAI

Institute for Structural
and Engineering
Materials

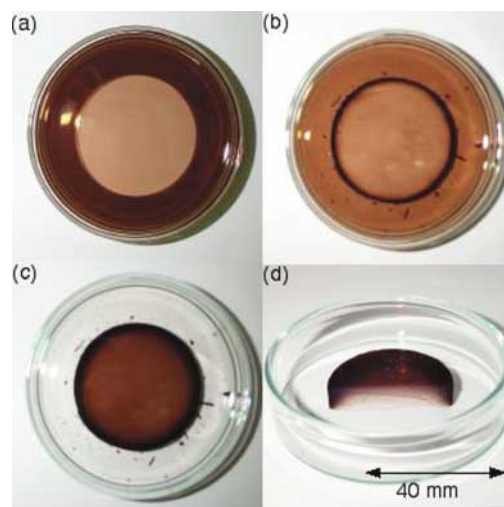
e-mail:

tai.y@aist.go.jp

AIST Today Vol. 3, No. 2

(2003)12

A nanocomposite of dodecanethiol-passivated Au nanoparticles (average diameter 2.6 nm) and a silica aerogel has been fabricated. It was found that the Au particles were efficiently adsorbed on a silica wet-gel in organic solvents and that the particles were not flushed out by supercritical CO₂ drying. The size distribution of the Au cores did not change in the drying process. The composite formation from the preformed nanoparticles and silica gel, and the formation of composite aerogel without changing the particle sizes can lead to a simple and efficient way to production of devices with non-linear optical property or high catalytic activity.



Photographic images of silica wet-gel in the Au nanoparticle-toluene solution at (a) 0, (b) 5, and (c) 57 hours after immersion. (d) a photographic image of the nanoparticle /silica composite aerogel. The product aerogel was cut into two to show the spatial distribution of the nanoparticles.

Active Micromixer Array for Microfluidic Systems

Zhen YANG

Institute of Mechanical
Systems Engineering

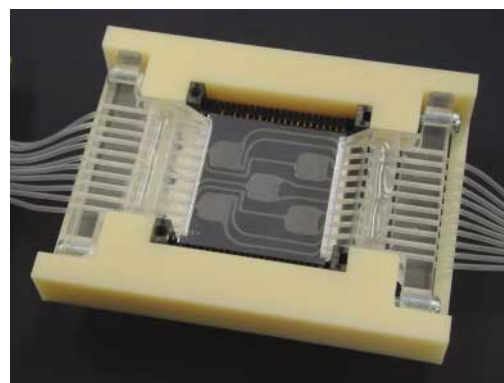
e-mail:

zhen.yang@aist.go.jp

AIST Today Vol. 3, No. 2

(2003) 13

A micromixer array for continuous flow has been developed. The device is fabricated using micromachining technologies. The pattern of inlets, outlet and mixing chamber are formed in glass. The entire flow path is encapsulated by anodic bonding of a Si wafer to the glass. A bulk piezoelectric PZT ceramic is adhered on the back-side of each mixing chamber. When a piezoelectric ceramic is excited by a 60 kHz square wave, mixing occurs directly from the ultrasonic irradiation. Both qualitative and quantitative evaluations have been done. It shows an effective and reliable solution with fully controlling for integrated microchemical synthesis systems or for micro total analysis systems.



A 5-micromixer array chip mounted on a testing socket. Each mixer has two inlets and one outlet. The volume of each mixing chamber is 0.7 μ l.