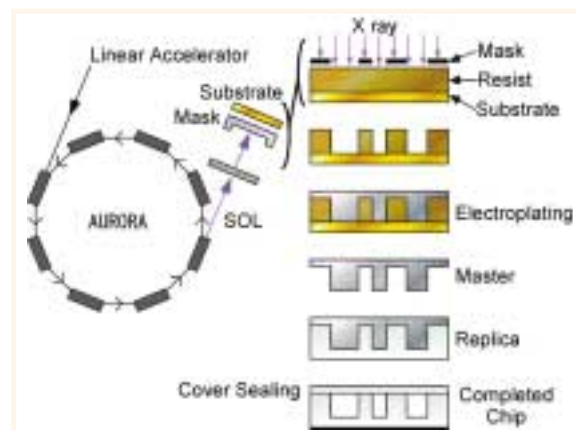


# Plastic Based Lab-on-a-Chip Devices using LIGA Process

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AIST Today Vol. 1, No. 6  
(2001) 14

Microfluidics based Lab-on-a-Chip (LOC) technology has been attracted significant attention due to its novel advantages. Most of LOC was made from glasses as it is easily control of microfluids using the quartz chip. We focused on the fabrication of plastic chip, which has additional advantages of disposable chip especially for body fluid, cell and so on using LIGA process as shown in Figure in re-search cooperation with the Ritsumeikan University. We are now under investigation of chip tests, improvement of fabrication process.

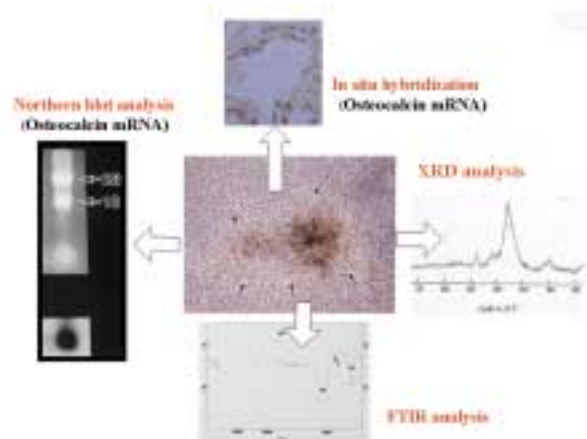


Plastic fabrication using LIGA process

# Tissue Engineered Bone Derived from Marrow

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AIST Today Vol. 1, No. 6  
(2001) 20

Many geriatric patients need total joint replacements; these prosthetic devices have problems including aseptic loosening of the implants. To prevent the loosening, we propose a new concept, which is to coat joint prostheses with osteogenic cells or their precursors. Fresh bone marrow would be collected from the patient, and the mesenchymal stem cells (MSCs) isolated, expanded in number in culture, and subsequently cultured on the surface of the prostheses under osteogenic conditions. The surface of the prostheses would be covered with bone (osteoblasts and bone matrix) derived from the patient's own cells. This bone would possess the capability for bone bonding as well as new bone formation. Due to this biologic surface reconstruction, loosening can be avoided, while the post-operative rehabilitation program can be shortened due to early and secure bone formation around the implanted prosthesis.



**In vitro bone formation**  
Cultured marrow cells can differentiate into osteoblasts evidenced by Osteocalcin mRNA expression (Northern blot analysis and In situ hybridization). The osteoblasts fabricate mineralized bone matrix comparable to natural bone evidenced by XRD and FTIR analysis.