

RIKEN Seminar

“In situ forming Hydrogels (Injectable, Sparyable and Tissue Adhesive) for Tissue Regeneration and Drug Delivery”

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Cooperation Center W524-525

Prof. Ki Dong Park

Department of Molecular Science and Technology/Applied Chemistry and
Biotechnology/Biomedical Engineering, Ajou University,

Injectable hydrogels have been utilized as therapeutic implants and vehicles of drugs, proteins and cells for therapeutic applications, as they have several advantages based on minimally invasive injection procedure. In our group, various types of in situ forming hydrogels have been developed as injectable and sprayable bioactive matrices. The hydrogel matrices were made of various synthetic and natural polymers, including PEO-PPO copolymers (e.g. Tetronic and Pluronic), gelatin, chitosan, hyaluronic acid, and heparin. These polymers were functionalized with phenol-derivatives, which can be crosslinked to form the hydrogels in situ via enzyme-mediated reaction using horseradish peroxidase (free/immobilized HRP) in the present of hydrogen peroxide (H_2O_2) or Glucoseoxidase(GOx) under physiological conditions, and the physico-chemical properties of the gel matrices could be controlled by varying material parameters. These In situ gelling systems have been extensively evaluated using various peptides, proteins, and cell types as well as in vivo animal models.

Obtained results demonstrated that the in situ forming hydrogels have a great potential for use as an injectable and sprayable materials for tissue regeneration and drug delivery.

Contact: Nano Medical Engineering Laboratory (ex. 8519)