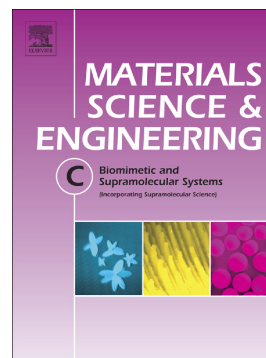


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Facile *in situ* formation of hybrid gels for direct-forming tissue engineering**Jun-Sung Oh^a, Jeong-Soon Park^a, Cheol-Min Han^{b*}, Eun-Jung Lee^{a*}**

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ABSTRACT

Development of bioactive hydrogel as extracellular matrix (ECM) is a very important field for cell-based therapy. In this study, we provided a facile method based on sol-gel process for fabricating bioactive composite hydrogels. The composite hydrogels were composed of sol-gel derived silica and biopolymer. Different amounts of silica solution (20-80 wt %) were mixed with 2 % polymer sol (alginate) followed by aging and gelation to form a network so that the alginate-silica hybrid mixture could form a gel without any additional crosslinking process. The self-gelation time of the hybrid hydrogel measured by rheometer was reduced as the content of silica was increased. Such hydrogels had highly porous and interconnected structures. Their strut showed uniform surface texture. Under physiological conditions (PBS, 37 °C), these hybrid hydrogels exhibited long-term stability compared to alginate hydrogels as control. The mechanical properties of these hydrogels such as compressive strength, compressive modulus, and work of fracture were significantly enhanced by hybridization with sol-gel derived silica. *In vitro* cell tests revealed that these hybrid hydrogels exhibited

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