

Micropatterned PEDOT:PSS-incorporated conductive hydrogel for a cardiac tissue engineering

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Micro-patterned hydrogel with electrical conductivity is a promising approach for a cardiac tissue engineering. Here, we create a hybrid hydrogel presenting PSS semi-IPN network structure within the PEG hydrogel. This can be achieved by polymerizing EDOT monomer inside the micropatterned PEG hydrogel including PSS. This resultant hydrogel combines electrical properties and topological properties. The surface modification is necessary to attach C_2C_{12} cells on the hydrogel surface. SEM Images show pattern sizes and PEDOT Particles formed on the surface and a cross-section of this material. Likewise, we can demonstrate roughness is increased after EDOT polymerization through AFM Images. In-vitro studies indicate that C_2C_{12} cells cultured on the hydrogel have well-aligned morphology along the direction of the patterns. Furthermore, we can prove this hybrid hydrogel is biocompatible as C_2C_{12} cells are alive after 6days. The fascinating outcomes of this novel hydrogel are expected to have opportunities for the further studies of cardiac tissue regeneration.