Injectable OPF/graphene oxide hydrogels provide mechanical support and enhance cell electrical signaling after implantation into myocardial infarct

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Figure S1. The time-dependent measurement of the electrical conductivity of OPF (black line) and OPF/GO (red line) hydrogel. (n=3/group)
Figure S2. OPF/GO hydrogel supports cell growth *in vitro*.

A. Cardiac fibroblasts were seeded on the surface of OPF/GO hydrogels coated wells. B. Representative morphological images of cardiac fibroblasts cells cultured for 48 h on OPF or different composites OPF/GO (0.3 mg/mL, 0.6 mg/mL, 1.0 mg/mL) coated substrates.
**Figure S3.** Micrographs of rat infarcted tissue in the left ventricular responses to PBS, OPF and OPF/GO after different implantation time.

A. Micrographs of infarcted tissue in the left ventricular response to PBS, OPF and OPF/GO after different implantation times. OPF/GO hydrogel can be seen in the scar and border zone. B. The maintenance and continuous distribution of OPF/GO along infarcted region. *p < 0.05, or **p < 0.01.
Figure S4. The formation of gap junction associated proteins in the infarcted region of PBS, OPF and OPF/GO injected groups at 2 weeks (A) and 3 weeks (B) post MI. The representative fluorescent images show the specific markers of gap junctions and cardiomyocytes (Cx43 (green), cTNT (red), DAPI (blue)).
Figure S5. OPF/GO conductive hydrogel promoted the angiogenesis.

The mRNA level of α-SMA (A), vWF (B) and VEGF (C) in PBS, OPF and OPF/GO injected groups 4 weeks after MI. D. Immunofluorescent staining revealed a higher density of α-SMA positive capillaries in the infarcted region of OPF/GO hydrogel treated group compared to OPF and PBS treated group. E. High magnification images of the undegraded OPF/GO hydrogel appeared to distribute in the anterior wall, cells ingrowth was found inside or around the hydrogel area, with some regions of this tissue structure staining positively for α-SMA. *p < 0.05, or **p < 0.01.
Movie S1

*Ex Vivo* Measurement of Skeletomuscular signal propagation through OPF/GO

Movie S2

*Ex Vivo* Measurement of Skeletomuscular signal propagation through OPF

Movie S3

Calcium transients Signal Conduction of isolated cardiomyocytes in the infarcted area of OPF/GO group

Movie S4

Calcium transients Signal Conduction of isolated cardiomyocytes in the infarcted area of OPF group

Movie S5

Calcium transients Signal Conduction of isolated cardiomyocytes in the infarcted area of PBS group
Supplementary Table 1

<table>
<thead>
<tr>
<th>q-PCR primers for mRNA expression</th>
<th>Forward Primer Sequence</th>
<th>Reverse Primer Sequence</th>
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<tr>
<td>GAPDH Forward</td>
<td>AGTTCAACGGCACAGTCAAG</td>
<td>TACTCAGCACCAGCATCACC</td>
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<td>a-SMA Forward</td>
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<td>VEGF Forward</td>
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