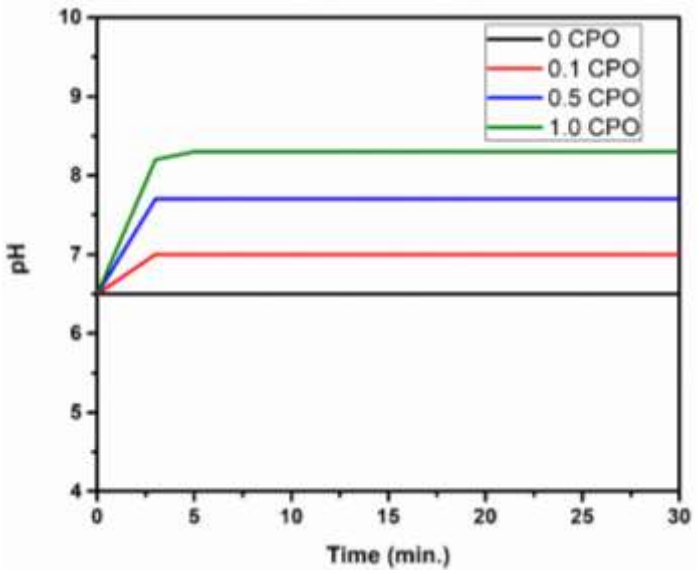
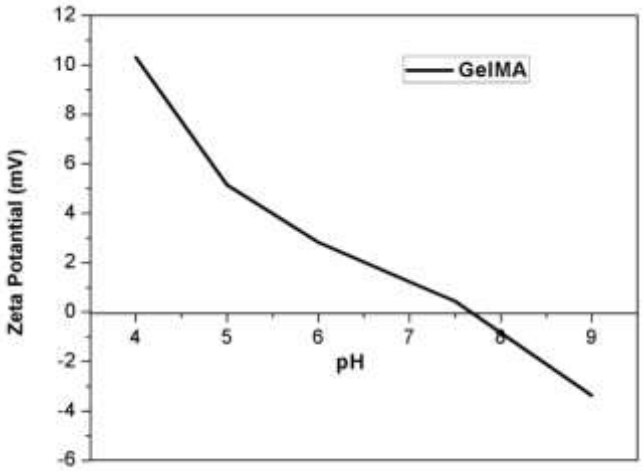
Supplementary materials



S#1. pH of bioink solution with different CPO contents with HCl. In these compositions, we used 10% GelMA and HCL corresponding to CPO content which are shown in the table above. We can regulate the pH of the bioink by using HEPES buffer and HCL. Because the addition of CPO to the solution increases pH, HCl was used to control the pH of 0.1, 0.5 and 1% CPO containing solutions and the pH of these solutions was fixed at 7.0, 7.8 and 8.2, respectively.



S#2. Influence of pH on zeta-potential measurement of 0.5 (w/v%) GelMA solution, Zeta potential determined as 7.8 for the GelMA: For the iso-electric point determination of GelMA, zeta potential of GelMA solution (0.5 w/v%) prepared with distilled water, was determined using Malvern Zetasizer. The pH of solution can affect the viscosity of the bioinks. According to the zeta potential measurement, the iso-electric point of GelMA is around 7.8, meaning that the highest viscosity for GelMA is at this specific pH value.

S#3. Oxygen releasing images of fresh bioink after adding CPO to the solutions. Oxygen releasing from 0.5 CPO specimens was higher than the others.

	0 CPO	**0.1 CPO**	**0.5 CPO**	**1.0 CPO**
C	56.21	53.17	48.02	46.43
N	10.97	10.24	8.66	7.23
O	24.15	25.52	24.89	21.8
Ir	1.62	2.04	2.03	1.65
S	7.02	6.55	8.43	5.32
Cl	0	1.63	4.98	9.91
Ca	0	0.81	2.95	7.63

S#4. EDX results, representing the atomic percentages (%) of various elements in different hydrogels related to **Fig. 3B**.

S#5 (MOV1): Video showing the delivery of the printed oxygenated cardiomyocyte-laden patch and its retrieval using a pipette. This illustrates the potential of using the 3D printed construct to be delivered on the heart by using minimally invasive procedure such as thoracoscopy. In addition, the patch can be retrieved and delivered many times as needed.

S#6 (MOV2): Video showing the ease of handling of printed mesh patch using forceps.

S#7 (MOV3): Video showing contractile activity of cardiomyocytes in the 3D printed constructs having 0.5% CPO at day 7 of incubation."