The 9th International Conference on Manufacturing, Machine Design and Tribology

The Korean Society of Mechanical Engineers

The Japan Society of Mechanical Engineers

JEJU CVB 제주컨벤션뷰로

WISEITECH (주)위세아이텍

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Program at a Glance

<table>
<tr><th></th><th>March 8 (Wed)</th><th>March 9 (Thu)</th><th>March 10 (Fri)</th><th>March 11 (Sat)</th></tr>
<tr><td>08:00 ~ 08:30</td><td rowspan="14">Arrival & Welcome</td><td rowspan="2">Registration</td><td></td><td rowspan="2"></td></tr>
<tr><td>08:30 ~ 09:00</td><td rowspan="2">Registration</td></tr>
<tr><td>09:00 ~ 09:30</td><td rowspan="2">Parallel Session 1
15 min / Person</td><td rowspan="3">Poster Session 2</td><td rowspan="4">Pannel Discussion</td></tr>
<tr><td>09:30 ~ 10:15</td></tr>
<tr><td>10:15 ~ 10:30</td><td>Coffee Break</td></tr>
<tr><td>10:30 ~ 11:00</td><td>Opening Ceremony</td><td>Coffee Break</td><td rowspan="15"></td></tr>
<tr><td>11:00 ~ 11:30</td><td rowspan="2">Keynote Speech 1
(1, 2)
30 Min / Person</td><td rowspan="2">Keynote Speech 2
(3, 4)
30 Min / Person</td></tr>
<tr><td>11:30 ~ 12:00</td></tr>
<tr><td>12:00 ~ 12:30</td><td rowspan="2">Lunch</td><td rowspan="2">Lunch
(Delegation
Meeting)</td></tr>
<tr><td>12:30 ~ 13:00</td></tr>
<tr><td>13:00 ~ 13:30</td><td rowspan="3">Parallel Session 2
15 min / Person</td><td rowspan="3">Parallel Session 4
15 min / Person</td></tr>
<tr><td>13:30 ~ 14:00</td></tr>
<tr><td>14:00 ~ 14:30</td></tr>
<tr><td>14:30 ~ 15:00</td><td>Coffee Break</td><td>Coffee Break</td></tr>
<tr><td>15:00 ~ 15:30</td><td rowspan="4">Registration</td><td rowspan="3">Parallel Session 3
15 min / Person</td><td rowspan="3">Parallel Session 5
15 min / Person</td></tr>
<tr><td>15:30 ~ 16:00</td></tr>
<tr><td>16:00 ~ 16:30</td></tr>
<tr><td>16:30 ~ 17:00</td><td>Coffee Break</td><td>Coffee Break</td></tr>
<tr><td>17:00 ~ 17:30</td><td rowspan="3">Welcome
Reception</td><td rowspan="2">Poster Session 1</td><td rowspan="2">Closing Ceremony</td></tr>
<tr><td>17:30 ~ 18:00</td></tr>
<tr><td>18:00 ~ 18:30</td><td rowspan="4">Banquet</td><td rowspan="4"></td></tr>
<tr><td>18:30 ~ 19:00</td><td rowspan="3">KSME / JSME
Joint Delegation
Meeting</td></tr>
<tr><td>19:00 ~ 19:30</td></tr>
<tr><td>19:30 ~ 20:00</td></tr>
</table>

Session Program Overview (2/2)

Time	Friday, March 10, 2023				
	Room A	Room B	Room C	Room D	Room E
8:30	Registration				
9:30	Poster Session 2 (Room A)				
10:30	Coffee Break				
11:00	Keynote Speech 3 (Room A)				
11:30	Keynote Speech 4 (Room A)				
12:00	Lunch Break				
13:00	Micro / Nano Processing and Tribology 1 FrA1-1 ~ FrA1-6	Sensors FrB1-1 ~ FrB1-5	Friction and Wear Mechanism FrC1-1 ~ FrC1-6	Other Topics of Interest 1 FrD1-1 ~ FrD1-6	Machine Design / Machine Elements 4 FrE1-1 ~ FrE1-5
14:30	Coffee Break				
15:00	Micro / Nano Processing and Tribology 1 FrA2-1 ~ FrA2-5	CAD / CAM, Integrated Product and Process Design (IPPD) FrB2-1 ~ FrB2-4	Friction and Wear Mechanism, Contact Mechanics, Lubricants FrC2-1 ~ FrC2-4	Other Topics of Interest 2 FrD2-1 ~ FrD2-5	Manufacturing Systems, Printing Technology for Manufacturing FrE2-1 ~ FrE2-4
16:30	Coffee Break				
17:00	Closing Ceremony (Room A)				

ICMDT 2023

Proceedings of the 9th International Conference on Manufacturing, Machine Design and Tribology

3D Printing of a Conductive Hydrogel for Continuously Monitoring of Electrophysiological Signals from Engineered Cardiac Tissue

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Abstract

The advances in cardiac tissue engineering have provided opportunities to study drug-induced cardiotoxicity and congenital heart diseases *in vitro*. Monitoring of the electrical activity of engineered cardiac tissues has been considered as a basis of these research since cardiac cells communicate each other through the propagation of electrical signals. However, conventional metallic electrodes are based on a hard, dry, and inorganic substance, which are contrary to the characteristics of soft, wet, and living biological tissues. In recent studies, poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS) has been emerged as a conductive hydrogel and is utilized as implantable electrodes. Here, we developed a conductive wire by 3D printing PEDOT:PSS to map the electrophysiological signals from three-dimensional (3D) engineered cardiac tissues. To electrically insulate the conductive wire from the culture medium, a conductive hydrogel-strut was passivated with a top and bottom silicone sheath. The electrical properties of the developed conductive wire were evaluated, and 3D engineered cardiac tissues were generated by encapsulating induced pluripotent stem cell-derived cardiomyocytes and cardiac fibroblasts into heart-derived decellularized extracellular matrix. Finally, we monitored the field potential of the 3D engineered cardiac tissues by using the hydrogel-based conductive wire. In the future, we expect that the developed hydrogel-based conductive wire can be integrated into 3D engineered cardiac tissues, ultimately can be used for a platform for studying drug-induced cardiotoxicity tests and congenital heart diseases *in vitro*.

Acknowledgement

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