

Enabling Model Parts for a Highly Realistic Surgery Simulator Using Multi-scale, Multi-material Modeling Technology

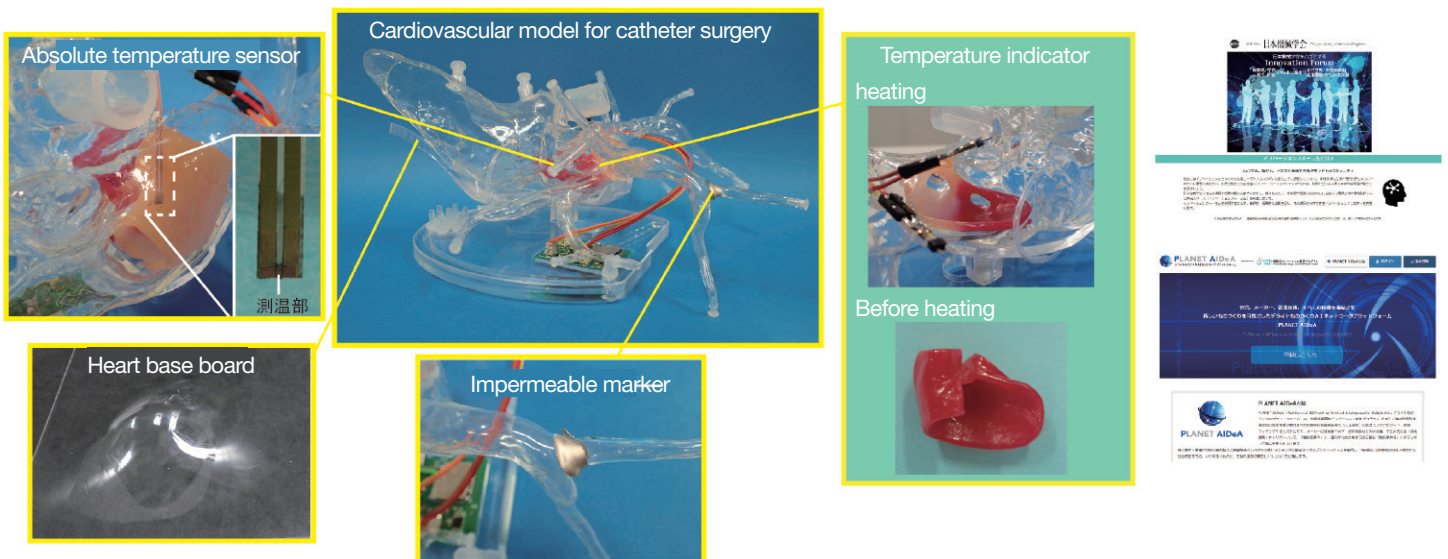
About this Project

■Highly-realistic tangible surgery simulator models that enable quantitative evaluation of surgery techniques

We have developed each separate element of a technology that enables multi-scale composite structure models using multi-materials derived from metals and polymers which have heretofore posed problems in 3D modeling. As an example of its implementation, we created a trial cardiovascular model for catheter surgery as a high-value-added medical equipment. As a surgery simulator that can take temperature measurements, this model enables doctors to qualitatively evaluate surgery techniques.

■An innovation society to quicken the pace of innovation

We constructed a hub to speed the pace of innovation (Innovation Society) at the Japan Society of Mechanical Engineers, connecting the seeds (players in a wide swath of industries) to both the real and potential needs of users.



Test Uses / Application Examples

We installed heart and blood vessel modeling modules in the EVE2 surgery simulator from FAIN-Biomedical, a venture company from collaborative site manager Nagoya University, and evaluated it. We are improving every part of it which is applicable to surgery.



Research Achievements

① 3D printing of metal-polymer composite materials (Nagoya University)

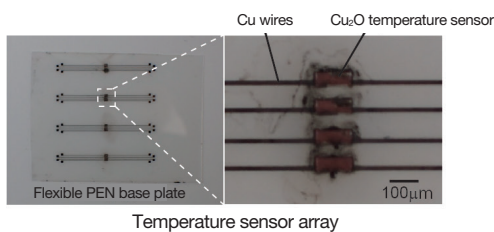
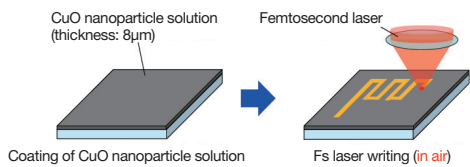
Production of an absolute temperature sensor using laminated modeling technology for non-noble metals and polymers in air

② 3D Printing of Polymers with Multiple Properties and Multiple Scales (Nagoya University)

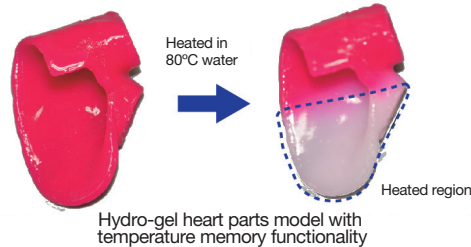
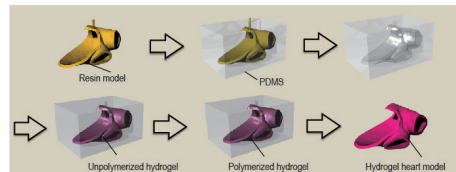
Production of parts of the heart with temperature measuring functionality using production technology for differing polymers with differing functionality

③ Die-free Hybrid Sheet Metal Forming Technology (University of Fukui)

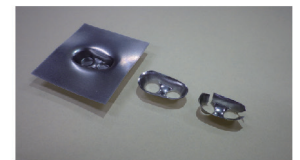
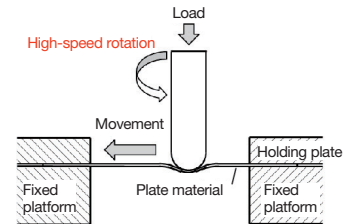
Impermeable x-ray marker and production of an EVE2 enclosure using incremental forming



① Femtosecond laser-reduction direct writing method



② Multi-material molding system



X-ray impermeable marker

③ Incremental forming

Future Outlook

■ Making tangible surgery simulator models (EVE2) high-functioning

We aim to sell precision heart models to various medical institutions and medical device manufacturers, and to spread development techniques through their use cases.

■ Realizing Innovation Society

We will release all of the Innovation Society's systems for through the Japan Society of Mechanical Engineers, and create a virtual meeting place that will contribute to innovation. Also, we will conduct technology matching through PLANET AIDeA, further partnering to encourage innovation.



Research Theme : Development of Manufacturing Technology for Innovative Apparatus and Innovation Society from Central Japan

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