

Division of Mechanical Science and Engineering	Research field	Bioengineering	Lab. ID
			MS23
Laboratory web site	<a href="https://sites.google.com/view/bioengineering-lab-tanaka/">https://sites.google.com/view/bioengineering-lab-tanaka/</a>		
<b>Research subjects</b>			
<p>The mission of this laboratory is to create novel and effective methodologies of treatment, prevention, and diagnosis for osteoporosis from the aspect of bioengineering. For the treatment, tissue-engineered bones with highly-mechanocompatible with bone tissue are studied utilizing techniques of tissue-engineering. For the prevention, we focus on electromyostimulation on as a promising non-pharmacological intervention, feasible for elderly people, to prevent osteoporosis. For the diagnosis, we are developing an optical bone densitometer utilizing infrared laser diodes, which smaller, safer, and easier to operate than the conventional X-ray device. To these ends, cell culture, animal experiments, and computer simulations are performed in our laboratory.</p>			
<b>Master/Doctor course: Education policy, curriculum, typical activity in the laboratory</b>			
<p>Acquiring broad knowledge is required to accomplish a bioengineering research. Knowledge of biology and medicine are important in applications of the research to clinical and engineering fields. Several research groups are organized in the laboratory and each group presents the progress of research project in a lab meeting weekly. Small meetings with the professor are also held at any time and current problems are deeply discussed. Spontaneous actions are required for all students based on thier research plan, managing time and relationships with other lab members</p>			
<b>Daily life in the laboratory, etc.</b>			
<p>All information about our laboratory such as lab meeting schedule, experimental protocols, and graduation/master theses are accessible in our private laboratory web site. All students use their own laptop computers in the laboratory, and access to Internet through the university Wi-Fi network. Workstation PCs are also available in our laboratory for various simulation, CAD, and image processing. To deal with animals and cells, the special knowledge and experimental skill are required for all the students.</p>			
<b>Message or comments by the laboratory faculty staffs</b>			
<p>Technological innovations are often created in the border areas of established academic or engineering fields. Bioengineering is in the border area including mechanical engineering, medicine, biology, and material engineering and so on, in which our creativity is stimulated by the variety of concepts. Environmental diversity promotes our adaptability to the rapid-changing global society, recommending us to study broad knowledges, especially abroad.</p>			
<b>Recent Master theses in these 3 years (+ more if appropriate)</b>			
year.month	Thesis title (including English translation of Japanese thesis title)		
2017.3	Development of a composite material for bone regeneration using nano-calcined bone powder and alginate acid		
2017.3	Development of a mathematical model to predict the non-linear response of a bone cell to physical stimulation		
2017.3	Evaluation of osteoconductive ability of calcined bone as a bone tissue engineering material		
2016.3	Development of optical bone densitometer		
2016.3	Study on non-linear osteoblastic response to physical stimulation		
2016.3	Evaluation of the mechanical properties of tissue-engineered bone under impact loading		
2016.3	Study on osteogenic effect of electrical muscle stimulation		
2015.3	Osteogenic effect of electromagnetic filed stimulation on an OVX rat		
2015.3	Improvement of mechanical properties of a tissue-engineered bone constructed with a calcined bovine trabecular bone scaffold using electromagnetic field stimulation		
2014.3	Development of an optical device for monitoring of calcification in a tissue-engineered bone		
2014.3	Osteogenic effect of electrical muscle stimulation with random pulse train waveform		
2013.3	Study on osteogenic effect of electrical muscle stimulation		
2013.3	Study on promotion effect of electromagnetic filed with random pulse train on osteoblastic calcification in vitro		
<b>Recent Doctoral theses in these 3 years (+ more if appropriate)</b>			
year.month	Thesis title (including English translation of Japanese thesis title)		
Laboratory mail address	shigeo@se.kanazawa-u.ac.jp		