

Division of Electrical Engineering and Computer Science	Research field	Nanoscale Measurement Technologies	Lab. ID EC02
Laboratory web site	http://fukuma.w3.kanazawa-u.ac.jp/		
Research subjects			
<p>We are working on instrumentation of atomic force microscopy (AFM) and its applications to various studies in academic and industrial fields. In AFM, a sharp tip is scanned over a surface to form an atomic-scale topographic image. Among several operation modes of AFM, frequency modulation AFM (FM-AFM) provides the highest spatial resolution. In 2005, Prof. Fukuma enabled its operation in liquid with true atomic resolution for the first time in the world. Based on this achievement, we are working on the instrumentation and applications of the world-leading AFM techniques.</p>			
Master/Doctor course: Education policy, curriculum, typical activity in the laboratory			
<p>Through research activities, students are expected to learn interesting and exciting aspects of research as well as to acquire an ability to solve unexperienced problems by themselves. To this end, we provide abundant opportunities to have discussions with your supervisor. All the students have a 5-10 min meeting with Prof. Fukuma in every morning. We also have a weekly meeting for each subgroup consisting of Prof. Fukuma and 3-5 students. In addition, we have a monthly meeting, where all the students give a research progress report or a presentation on a research article.</p>			
Daily life in the laboratory, etc.			
<p>All the members are supposed to come to the lab. by 9:30AM but they can freely decide when they go home. This is for helping students to have a healthy life cycle and for facilitating communications between the members. Beside the research meetings described above, we have an individual monthly meeting to discuss personal issues (Professor). Each student is provided with a personal desk space with a high-spec. PC and hence can focus on research (M2). We have several recreational events such as fishing and hiking every year to promote friendship (D3).</p>			
Message or comments by the laboratory faculty staffs			
<p>After obtaining a master's degree, one student per a few years goes to doctoral course. In the meanwhile, most of the students find a job in computer and electronics industry but some in chemistry or mechanics. Nanoscale measurement technology is an interdisciplinary research area and hence related to almost all the academic fields including physics, engineering, chemistry and biology. Thus, students have a relatively broad range of options in their professional career. In our lab., we collaborate with many industrial companies. Thus, some students find a job in one of these companies.</p>			
Recent Master theses in these 3 years (+ more if appropriate)			
year.month	Thesis title (including English translation of Japanese thesis title)		
2017.3	Development of Atomic Force Microscopy Technique for Local Potential Distribution Measurements in Liquid and Its Applications to Nanoscale Studies on Metal Corrosion Mechanism		
2017.3	Development of liquid-environment AFM with membrane shield structure and glass long probe		
2016.3	Spatial distribution of nanoscale molecular chains at protein surfaces visualized by atomic force microscopy		
2016.3	Three-dimensional measurements of hydration and molecular adsorption structures using AFM with subnanometer-scale resolution		
2015.3	Development of atomic force microscopy technique for local potential distribution measurements in liquid and its applications to nanoscale studies on metal corrosion mechanism		
2015.3	Development of magnetic cantilever excitation system for atomic force microscopy in liquid		
2014.3	Improvements of stability and sensitivity of frequency modulation atomic force microscopy and its application to energy dissipation measurements		
2013.3	Investigation on crystal growth and dissolution processes of CaF ₂ in water by atomic-resolution liquid-environment AFM		
2013.3	Subnanometer-scale imaging of tubulin structures by liquid-environment atomic force microscopy		
2013.3	Development of high-speed atomic-resolution AFM for liquid-environment applications using separate-type scanner		
Recent Doctoral theses in these 3 years (+ more if appropriate)			
year.month	Thesis title (including English translation of Japanese thesis title)		
2017.3	Molecular-scale investigations on self-assembled monolayers with a control function of molecular adsorption by atomic force microscopy in liquid		
2016.3	Nanoscale Investigation on Stainless Steel Corrosion by Open-loop Electric Potential Microscopy in Liquid		
2016.3	Development of High-speed Liquid-environment Frequency Modulation Atomic Force Microscope and Its Applications to Atomic-level Investigation on Calcite Crystal Dissolution Processes		

2015.3 Improvement of stability and speed in liquid-environment atomic force microscopy

Laboratory mail address

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