## Program of Biotribology Sendai 2019

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### 15th Sep. 2019

Opening remarks 9:00 – 9:10
Chairman of Organizing Committee Sawae Y

### Session I  Cell 9:10 – 10:40

Chairperson: Medley JB

I-1  Keynote talk
A Bio-tribometer to Assess Cell Response to Metal Wear Debris and Ions in situ,
Wimmer MA, Ebinger K, Radice S, Samelko LA, Pourzal R, Hallab NJ,
Rush University Medical Center, USA
I-2
Pathogenic red blood cell tribological property probed with the Circular Mode Atomic Force Microscopy,
Noel O1, Nguyen A1, Franco M2, El Nemer W2, El-Kirat K3, Mazeran PE4,
1 Institute of Molecule and materials of Le Mans, Le Mans Université, France, 2 National Institute of blood transfusion, Université Paris-Diderot, France, 3 Biomechanical and Bioengineering laboratory, UTC, France, 4 Roberval laboratory, UTC, France

I-3
Mechanical properties of breast cancer cell membrane MDA-MB-231 probed with the Circular Mode Atomic force microscopy,
Nguyen A1, Blanckaert V2, Ullmann L2, Schoefs B3, Mimouni V2, Mazeran PE3, El-Kirat K4, Noel O1,
1 IMMM- Institut des Molécules et de Matériaux du Mans–CRNS, Le Mans Université, France, 2 Mer, Molecules, Marine, Le Mans Université, France, 3 Centre de recherche de Royallieu, Sorbonne University, France, 4 Biomechanics and Bioengineering, Sorbonne University, France

I-4
Evaluation of cell viability during cold storage using electrical impedance measurement,
Sei R1, Sato H2, Nebuya S3, Yoshida K1,2, Sakai R1,2, Ujihira M1,2,
1 Graduate School of Medical Sciences, Kitasato University, Japan, 2 School of Allied Health Sciences, Kitasato University, Japan, 3 Posh Wellness Laboratory, Inc., Japan

I-5
Radiological and histological examination of mice with severe bone defects by external fixator for bone transport,
Sakaguchi N1, Minehara H2, Tazawa R2, Kawamura T2, Matsuura T2, Takaso M2, Sakai R1,3, Yoshida K1,3, Ujihira M1,3,
1 Graduate School of Medical Sciences, Kitasato University, Japan, 2 Department of Medical Engineering and Technology, Kitasato University, Japan, 3 Department of Orthopedic Surgery, Kitasato University, Japan

10:40 - 10:55 Break

Session II Kinematics 10:55 - 12:05
Chairperson: Fujie H

II-1 Invited talk
Concurrent prediction of ground reaction and ankle joint forces during walking using musculoskeletal modelling,
Zhang Y\textsuperscript{1}, Chen Z\textsuperscript{2}, Peng Y\textsuperscript{3}, Jin Z\textsuperscript{1,4,5},
\hspace{1em}1 School of Mechanical Engineering, Xi’an Jiaotong University, China, 2 Key Laboratory of
\hspace{1em}Road Construction Technology and Equipment of MOE, Chang’an University, China, 3 Faculty
\hspace{1em}of Engineering, The Hong Kong Polytechnic University, China, 4 School of Mechanical
\hspace{1em}Engineering, Southwest Jiaotong University, China, 5 School of Mechanical Engineering,
\hspace{1em}University of Leeds, UK

II-2
Correlation between tactile perception and finger friction under different sliding directions,
\hspace{1em}Zhou X\textsuperscript{1}, Jiliang MO\textsuperscript{1}, Li Y\textsuperscript{2}, Jin Z\textsuperscript{1,3},
\hspace{1em}1 School of Mechanical Engineering, Southwest Jiaotong University, China, 2 School of
\hspace{1em}Economics and Management, Southwest Jiaotong University, China, 3 School of Mechanical
\hspace{1em}Engineering, University of Leeds, UK

II-3
Proposal of the estimation method of Destruction Energy,
\hspace{1em}Higaki M\textsuperscript{1}, Hatano N\textsuperscript{1}, Kono D\textsuperscript{2}, Matsumoto M\textsuperscript{1}, Matsumoto M\textsuperscript{1}, Hirayama T\textsuperscript{1}, Tomita N\textsuperscript{1},
\hspace{1em}1Department of Mechanical Engineering and Science, Kyoto University, Japan, 2 Department of
\hspace{1em}Micro Engineering, Kyoto University, Japan

II-4
Mechanical response of cartilage to tribological challenge - a 3-factor CCD analysis,
\hspace{1em}Yuh C, Witt B, Laurent MP, Wimmer MA,
\hspace{1em}Department of Orthopedic Surgery, Rush University, USA

12:05 - 13:30 Lunch & Organizing Committee Meeting

Session III Devices 13:30 – 14:45

Chairperson: Sawae Y

III-1 Keynote talk
Dental biotribology and bionic design
\hspace{1em}Zhou ZR, Zheng J,
\hspace{1em}Tribology Research Institute, Southwest Jiaotong University, China

III-2
Application of Pendulum Method for the Friction Measurement of Contact Lenses,
\hspace{1em}Mabuchi K\textsuperscript{1}, Iwashita H\textsuperscript{2}, Hori H\textsuperscript{2}, Sakai R\textsuperscript{1}, Ujihira M\textsuperscript{1},
\hspace{1em}1 School of Allied Health Sciences, Kitasato University, Japan, 2 Graduate School of Medicine,
\hspace{1em}Toho University, Japan
III-3
Challenges in Biotribological Testing – from Food and Beverages to Cartilages,
Pondicherry KS1, Rummel F2,
1 Anton Paar GmbH, Austria, 2 Anton Paar Germany GmbH, Germany

III-4
Control of Protein Adsorption to Achieve Low Friction in Blood,
Kanda K, Adachi K,
Department of Mechanical Systems Engineering, Tohoku University, Japan

14:45 - 15:00  Break

Session IV  Artificial Joints  15:00 - 16:00  
Chairperson: Wimmer MA

IV-1
Is “Conventional” Polyethylene Finally Obsolete in THA?,
Medley JB,
Department of Mechanical and Mechatronics Engineering, University of Waterloo, Canada

IV-2
Investigation of hammering sound frequency to prevent intraoperative fracture during hip replacement: examination in biomechanical materials,
Kitazato T1, Sakai R1,2, Koyama M3, Otsu Y3, Kakeshita M3, Usui T3, Uchiyama K4, Fukushima K4, Yoshida K1,2, Mabuchi K, Ujihira M1,2,
1 Graduate School of Medical Sciences, Kitasato University, Japan, 2 Department of Medical Engineering and Technology, Kitasato University, Japan, 3 Mark Electronics Co., Ltd, Japan, 4 Department of Orthopedic Surgery, Kitasato University, Japan

IV-3
Comparison of contact pressure of internal fixation cables in femoral shaft with simulated tissue,
Yada T1, Sakai R2, Yoshida K2, Uchiyama K3, Mabuchi K2, Uzihira M2,
1 Graduate School of Medical Sciences, Kitasato University, Japan, 2 Department of Medical Engineering and Technology, Kitasato University, Japan, 3 Department of Orthopedic Surgery, Kitasato University, Japan

IV-4
The effect of acetabular cup surface texturing on friction of hip joint replacements,
Nečas D1, Usami H2, Niimi T3, Sawae Y4,
1 Faculty of Mechanical Engineering, Brno University of Technology, Czech Republic, 2 Faculty of Science and Technology, Meijo University, Japan, 3 Kanefusa Corporation, Japan, 4 Faculty
16:00 - 16:15  Break

**Session V  Material**  16:15 - 17:25  
Chairperson: Sakai R

V-1  Invited talk
Mechanical and Thermal Characterisation of Novel UHMWPE Composites for Total Joint Arthroplasty,
Emami N1, Somberg J1, Sawae Y2
1 Division of Machine Elements, Lulea University of Technology, Sweden, 2 Faculty of Engineering, Kyushu University, Japan

V-2  Investigations on the influence of graphene-based material fillers on surface properties and lubricated sliding wear behavior of UHMWPE based composite,
Shahemi N1, Liza S1, Sawae Y2
1 Malaysia-Japan International Institute Technology/Mechanical Precision Engineering, Universiti Teknologi Malaysia, Malaysia, 2 Faculty of Engineering, Kyushu University, Japan

V-3  Tribological studies of Hyaluronic acid and UHMWPE-filled SU-8 composites
Hirwani JK1, Shinmori H2, Sawae Y2, Sinha SK1
1 Mechanical Department, IIT Delhi, INDIA, 2 Department of mechanical engineering, Kyushu university, Japan

V-4  Development and application of accelerated delamination tests for polymeric articulating materials of artificial joints,
Sakoda H, Uematsu M, Okamoto Y, Haishima Y,
National Institute of Health Sciences, Japan

19:00 - 21:00  
Banquet (5,000 JPY, not included in conference fee)
16th Sep. 2019

**Session VI  Cartilage  9:00 - 10:15**
Chairperson: Yamamoto K

**VI-1 Keynote talk**
Synovial fluid pressurization enhances biphasic lubrication in articular cartilage,
Fujie H, Horibata S, Yarimitsu S,
Faculty of System Design, Tokyo Metropolitan University, Japan

**VI-2**
Understanding molecular level friction in articular cartilage using atomistic simulations,
Chatterjee A, Dubey DK, Sinha SK,
Mechanical Engineering Department, Indian Institute of Technology Delhi, India

**VI-3**
Influence of Collagen Fiber Structure Change in Superficial Zone on the Mechanical Property,
Takahashi T, Yarimitsu S, Fujie H,
Graduate School of System Design, Tokyo Metropolitan University, Japan

**VI-4**
Influence of Collagen Fibril Orientation on the Friction Property of Articular Cartilage,
Yarimitsu S, Ito K, Fujie H,
Graduate School of System Design, Tokyo Metropolitan University, Japan

10:15 - 10:30  Break

**Session VII  Friction I  10:30 - 11:25**
Chairperson: Nečas D

**VII-1 Invited talk**
Generation of lubrication function on the surface of cartilage tissue,
Yamamoto K¹, Sato R², Morita Y¹, Nakamachi E¹,
¹ Faculty of Life and Medical Sciences, Doshisha University, Japan, 2 Graduate School of Life and Medical Sciences, Doshisha University, Japan

**VII-2**
Influence of Loading Condition on Frictional Behavior of Poly(Vinyl Alcohol) Hybrid Gel as Artificial Cartilage,
Murakami T¹, Yarimitsu S², Nakashima K³, Sakai N⁴, Sasaki S⁵, Sawae Y⁵, Suzuki A⁶,
¹ Professor Emeritus, Kyushu University, Japan, 2 Division of Intelligent Mechanical Systems, Tokyo Metropolitan University, Japan, 3 Department of Medical Technology, Teikyo University,
Effect of unloading period on friction in biphasic lubrication in PVA hydrogel sliding,
Sakai N¹, Yarimitsu S², Sawae Y³, Sasaki S³, Komori M⁴, Murakami T⁵,
¹ Mechanical and Control Engineering, Kyushu Institute of Technology, Japan, ² System Design, Mechanical Systems, Tokyo Metropolitan University, Japan, ³ Department of Mechanical Engineering, Kyushu University, Japan, ⁴ Electrical and Electronic Engineering, Kyushu Institute of Technology, Japan, ⁵ Professor Emeritus, Kyushu University, Japan

11:25 - 11:40 Break

Session VIII  Friction II  11:40 - 12:40
Chairperson: Kanda K

VIII-1
Wear behavior of hydrogenated and non hydrogenated DLC films under bovine serum lubricated condition,
Liza S¹, Tan MY², Akasaka H³, Ohtake N⁴,
¹ Malaysia-Japan International Institute of Technology (MJIIT), Malaysia, ² Faculty of Engineering, University Malaya, Malaysia, ³ Department of Mechanical Engineering, Tokyo Institute of Technology, Japan, ⁴ Institute of Innovative Research, Tokyo Institute of Technology, Japan

VIII-2
Low-friction shaft seal composed of bio-inspired materials covering low-speed range under high hydrostatic pressure,
Nakanishi Y¹, Honda T², Kasamura K¹, Nakashima Y¹,
¹ Faculty of Advanced Science and Technology, Kumamoto University, Japan, ² Faculty of Science and Technology, Oita University, Japan

VIII-3
Adhesion-detachment dynamics of gecko-inspired adhesives,
Yamaguchi T¹, Akamine A², Sawae Y¹,
¹ Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Japan, ² Department of Mechanical Engineering, Graduate School of Engineering, Kyushu University, Japan
Effect of proteins on frictional behavior of copolymer hydrogels consist of hydrophilic and hydrophobic monomers,

Hirakawa T¹, Shinmori H¹, Morita T²,³, Yamaguchi T²,³, Nakata Y⁴, Sawae Y²,³

¹ Department of Mechanical Engineering, Graduate School of Engineering, Kyushu University, Japan,
² Department of Mechanical Engineering, Faculty of Engineering, Kyushu University, Japan,
³ International Institute for Carbon-Newtral Energy Research, Kyushu University, Japan,
⁴ Nippon Shokubai Co., Ltd., Japan

12:40 Closing remarks
Chairman of Organizing Committee Sawae Y

12:50 Lunch