14th International Conference on

Plasma Based Ion Implantation & Deposition

PBII&D 2017

New World Shanghai Hotel

October 17-20, 2017, Shanghai, China

Program

Organized by

Shanghai Institute of Ceramics, Chinese Academy of Sciences (SIC CAS)
Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences (SIMIT CAS)

14th PBII&D Committees

Organizer

Shanghai Institute of Ceramics, Chinese Academy of Sciences
Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences

International Organizing Committee

P. K. Chu (Chairman)	Hongkong, China
M. Bilek	Australia
N. Huang	China
S. Mändl	Germany
A. Márquez	Argentina
L. Pichon	France
X. B. Tian	China
M. Ueda	Brazil
R. H. Wei	USA

Local Organizing Committee

Xuanyong Liu (Chair)	Shanghai Institute of Ceramics, CAS
Zengfeng Di (Co-Chair)	Shanghai Institute of Microsystems and Information Technology, CAS
Yongfeng Mei	Fudan University
Zhenghua An	Fudan University
Zhongying Xue	Shanghai Institute of Microsystems and Information Technology, CAS
Huiliang Cao	Shanghai Institute of Ceramics, CAS

ID 08

Functionalizations of PTFE Surface for Antithrombogenicity, Endothelialization and Anti-inflammation

Ang Gao[1,2], Huaiyu Wang[1], Liping Tong[1], and Paul K Chu[2]

1 Center for Biomedical Materials and Interfaces, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen 518055, China
2 Department of Physics and Materials Science, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China

Abstract: Small-diameter vascular grafts made of biomedical polytetrafluoroethylene (PTFE) suffer from the poor long-term patency rate originating from thrombosis and intimal hyperplasia, which can be ascribed to the insufficient endothelialization and chronic inflammation of the materials. Hence, bio-functionalization of PTFE grafts is highly desirable to circumvent these disadvantages. In this study, a versatile "implantation-incubation" approach is described, in which the biomedical PTFE is initially modified by plasma immersion ion implantation (PIII). After the N_2 PIII treatment, the surface of biomedical PTFE is roughened with nanostructures and more importantly, the abundant free radicals generated underneath the surface continuously migrate to the surface and react with environmental molecules. Taking advantage of this mechanism, various biomolecules with different functions can be steadily immobilized on the surface of PTFE by simple solution immersion. As examples, three typical biomolecules, heparin, SDF-1α, and CD47 are covalently grafted onto the PTFE. In addition to retaining the bioactivity, the surface-functionalized PTFE exhibits reduced thrombogenicity, facilitates the recruitment of endothelial progenitor cells and even alleviates the inflammatory immune responses of monocytes-macrophages, hence is promising for the development of small-diameter prosthetic vascular grafts with good long-term patency.