



Protein adsorption and hydration structure of fluorine-containing synthetic polymers

Koguchi, Ryohei ; Jankova, Katja ; Tanaka, Masaru

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Koguchi, R., Jankova, K., & Tanaka, M. (2018). *Protein adsorption and hydration structure of fluorine-containing synthetic polymers*. Abstract from 2018 E-MRS Fall Meeting and Exhibit, Warsaw, Poland.

General rights

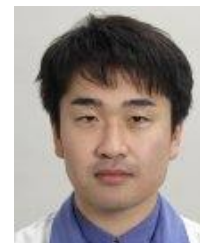
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Ryohei koguchi, PhD student

Soft Materials Chemistry, Institute for Materials Chemistry and Engineering,
Kyushu University, Japan
Research Center, Asahi Glass Co., Ltd.,
Tel: +81 928026238
E-mail: ryohei-koguchi@agc.com



I am a second year PhD student in Soft Materials Chemistry, Institute for Materials Chemistry and Engineering, Kyushu University, Japan. I received my B.D. in 2005, and M.D. in 2007. I am studying water and polymer interactions for the development of bio-inert materials.

Supervisor: Professor Masaru Tanaka

Soft Materials Chemistry, Institute for Materials Chemistry and Engineering,
Kyushu University, Japan, <http://www.soft-material.jp/>
E-mail: masaru_tanaka@ms.ifoc.kyushu-u.ac.jp



Recent publications about the intermediate water concept for high-throughput screening of biocompatible materials: *ACS Biomater. Sci. Eng.*, 4, 1591-1597 (2018). *Biomacromolecules*, 18, 1609-1616 (2017). *Biomacromolecules*, 18, 3834-3843 (2017). *Biomacromolecules*, 18, 4214-4223 (2017). *Macromolecules*, 49, 8154-8161 (2016). *ACS Biomater. Sci. Eng.*, 2, 2122-2126 (2016). *Biomacromolecules*, 17, 3808-3815 (2016). *Macromolecules*, 49, 2493-2501 (2016). *ACS Appl. Mater. Interfaces*, 7, 18096-18103 (2015). *Langmuir*, 31, 7100-7105 (2015). *Langmuir*, 30, 10698-10703 (2014). *Adv. Healthcare Mater.*, 3, 775-784 (2014). etc.

YSF Invited Oral/Poster Presentations

Protein adsorption and hydration structure of fluorine-containing synthetic polymers

Ryohei Koguchi,^{1,2} Katja Jankova,^{1,3} Masaru Tanaka^{1*}

¹ Soft Materials Chemistry, Institute for Materials Chemistry and Engineering, Kyushu University

² Research Center, Asahi Glass Co., Ltd.

³ Department of Energy Conversion and Storage, Technical University of Denmark

Poly(2-methoxyethyl acrylate) (PMEA) shows excellent blood compatibility due to the existence of intermediate water (1). Small amount of amino groups was found to change the hydration structure of 2-hydroxyethyl methacrylate when combining in a copolymer structure, which additionally decreased the interactions with lymphocytes (2).

Here we exploit another possibility to manipulate the surface hydration structure of PMEA by incorporation of small amount of other than nitrogen - the hydrophobic fluorine groups in MEA polymers using Atom Transfer Radical Polymerization and the (macro) initiator concept (3).

Focusing on the difference in mobility, two kind of fluorinated MEA polymers were synthesized using 2,2,3,3,4,4,5,5,6,6,7,7,8,8-pentadecafluoro-1-octanol (F15) and poly(2,2,2-trifluoroethyl methacrylate) (P3FM) (macro) initiators appearing liquid and solid at room temperature, respectively. The fibrinogen adsorption of the two varieties of fluorinated MEA polymers was different, that could not be explained only by the bulk hydration structure. Contact angle and AFM measurements reveal that the F15-PMEA reorients in water easily to the surface as compared to the P3FM-b-PMEA which reorientation was suppressed by the small solid fluorinated P3FM block.

These findings illustrate, that in order to make a better bio-inert material, the chains containing sufficient intermediate water need to be efficiently oriented to the water surface.

References:

- (1). M. Tanaka, A. Mochizuki. *J. Biomed. Mater. Res.* **2004**, 68A, 684-695.
- (2). T. Tsuruta. *J. Biomater Sc.* **2010**, 21, 1831-1848.
- (3). K. Jankova, X. Chen, J. Kops, W. Batsberg. *Macromolecules* **1998**, 31, 538-541.