Vincent Ball et al., J Material Sci Eng 2019, Volume 8
DOI: 10.4172/2169-0022-C6-140

From prebiotic chemistry to materials science: Deposition of aminomalononitrile based films

Vincent Ball[1,2], Roujun Toh[3], Richard Evans[3], Helmut Thissen[3] and **Marco d'Ischia[4]**
[1]Université de Strasbourg, France
[2]INSERM, France
[3]CSIRO Clayton, Australia
[4]University of Naples Federico II, Italy

Surface functionalization with strongly adhesive and easy to functionalize films has remained highly materials specific for a long time. But bio inspiration from the mussel which is able to adhere to almost all known materials under wet conditions has allowed the development of polydopamine films from the oxidation of dopamine. Other molecules seem promising in this perspective: inspiration from prebiotic chemistry and from the famous experience realized by Prof. Miller which allowed it to demonstrate that strongly adhesive and biocompatible films can be deposited at solid-liquid interfaces from aminomalonitrile solutions. In this presentation it will be demonstrated that similar aminomalononitrile based films can be obtained by electropolymerization. The mechanism of the film deposition and their morphology (Figure) will also be described. In particular we will show that films can also be deposited at liquid-air interfaces but having morphology and a composition different from that deposited at solid-liquid interfaces.

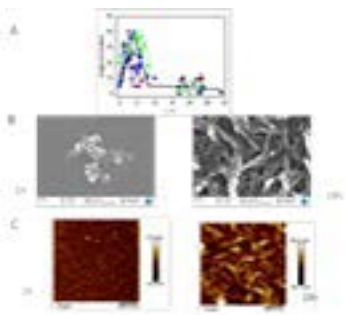

Figure 1: A: *water contact angles of AMN based films as a function of the deposition time, and B, C: film morphology after 1 and 19 has characterized by SEM (B) and AFM (C).*

Recent Publications

1. H Lee, S M Dellatore, WM Miller, PB Messersmith (2007) Mussel-inspired surface chemistry for multifunctional coatings. Science 318 (5849):426-430.
2. S L Miller (1953) A Production of Amino Acids Under Possible Primitive Earth Conditions Science 117 (3046):528-529.
3. D J Menzies, A Ang, H Thissen and R A Evans (2017) Adhesive prebiotic chemistry inspired coatings for bone contacting applications ACS Biomater Sci and Eng 3(5):793-806.
4. V Ball, R J Toh, N H Voelcker, H Thissen, R A Evans (2018) Electrochemical deposition of aminomalonitrile based films, Colloids and Surfaces A: Physicochemical and Engineering Aspects 552:124-129.

Biography

Vincent Ball has studied Physics and Physical Chemistry at the Université Louis Pasteur (ULP), in Strasbourg, where he got his PhD in 1996. After a Postdoc at the Biozentrum Basel from 1996 to 1997, he was appointed as the Assistant Professor in Analytical Chemistry at ULP and Professor in Chemical Engineering in 2005. His research interests focus on thermodynamics and kinetics of self-assembly at Interfaces, biomimetic chemistry and the design of biomaterials with designed electrochemical and mechanical properties. He published a monography "*Self-assembly processes at Interfaces-Multiscale phenomena*" at Academic Press) in 2017. He was an Invited Researcher at the Michigan University in 2007 as a Fulbright fellow as well as in CSIRO-Clayton in 2018.

Notes: