Proceedings International
Platinum Open Access Journal (ISSN 2668-6384)

Proceedings, Abstract
Volume 2, Issue 2, 2020, 17
https://doi.org/10.33263/Proceedings22.017017

Active Roles of Water in Aqueous Assembly of Macromolecules †

Xiaosong Wang [1,*]

[1] Department of Chemistry and Waterloo Institute for Technology, University of Waterloo, Waterloo, Canada, N2L 3G
* Correspondence: Xiaosong.wang @uwaterloo.ca (X.W.);
† Presented at Materials Chemistry and Physics (Materials Chemistry 2020) - International e-Conference
Received: 16.09.2020; Revised: 20.09.2020; Accepted: 24.09.2020; Published: 27.09.2020

Abstract: Aqueous self-assembly customarily focuses on the molecular interactions of assembling building blocks; the role of water is barely studied. The hydration of hydrophobic P^+X^- (P^+: macromolecular phosphonium cation, X^-: anion) is dependent on the ionic end groups, which is responsible for the consequent assembling behavior. The water interaction with the backbone was analyzed by FT-IR, and the dynamics were measured by low field-NMR spectroscopy. The combination of these two techniques reveals the effect of X^- on hydration. When X^- is I^-, the ionic end group ordered water molecules that exerted a detectable long-range effect de-hydrating the backbone. The consequent hydrophobic interaction drove the aqueous assembly of P^+I^- into micelle-like aggregates with the ionic group exposed to water. In contrast, the ion pair with a hydrophobic anion of $[BPh_4]^-$ was not able to hold water and did not deplete the hydration water. The hydrated backbone of $P^+[BPh_4]^-$ assembled into vesicles that were driven by hydration interactions. This elucidation at the molecular level is craved to progress aqueous supramolecular chemistry.

Keywords: aqueous assembly; hydrophobic effects; macromolecules.

Funding

This research was funded by the Natural Sciences and Engineering Research Council of Canada (NSERC) [funding reference number 50503-10556].

Acknowledgments

This research has no acknowledgment.

Conflicts of Interest

The authors declare no conflict of interest.