COLLEGE OF ENGINEERING

Chemical, Biological, and Environmental Engineering

MICRO AND NANOPLASTICS: EFFECT OF PLASTIC TYPE AND SURFACE CHEMISTRY ON NANOPLASTIC TRANSPORT THROUGH A SALINITY GRADIENT

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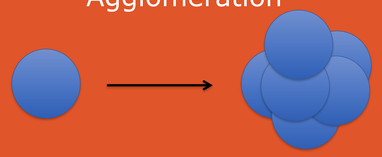
NANOPLASTIC (NP) POLLUTION IN THE ENVIRONMENT

- Enter the environment as components of waste streams or from the breakdown of larger plastic particles
- Represent a growing area of water quality concern due to the unique, size-specific characteristics of nanomaterials

WHAT INFLUENCES NANOPLASTIC AGGLOMERATION?

Agglomeration



- Agglomeration affects fate, transport, and exposure[1]
- Still need to explore properties influencing nanoplastic agglomeration as salinity changes[2]

USING FOUR TYPES OF 50NM NANOPLASTICS, WE ANALYZED:

- Surface charge
- Dye color
- Plastic type

PMMA

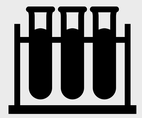
PS

PS = Polystyrene
PMMA = Poly(methyl methacrylate)

Oregon State University

METHODOLOGY

- Dialyzed nanoplastics
- Prepared dilutions of Pacific Ocean Water (0-35 g/L)
- Plastics dosed at 10ppm
- Dynamic light scattering used to detect size



EFFECT OF NP DYE COLOR

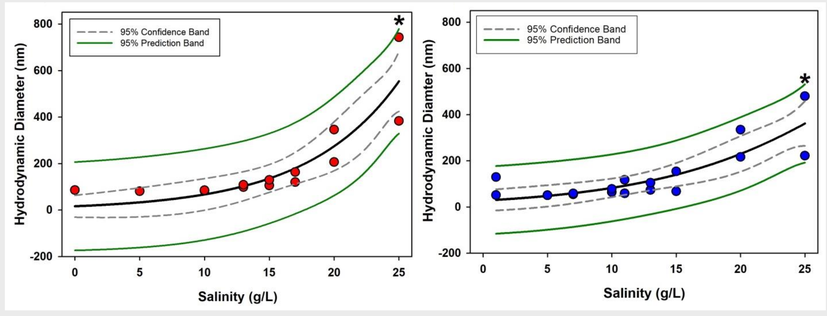


Fig. 1. Hydrodynamic diameter comparison of 50 nm Visiblex™ blue and red color dyed PS nanospheres in 0-25 g/L salinity gradient. Asterisk (*) represents a significant change in hydrodynamic diameter.

EFFECT OF NP CHARGE

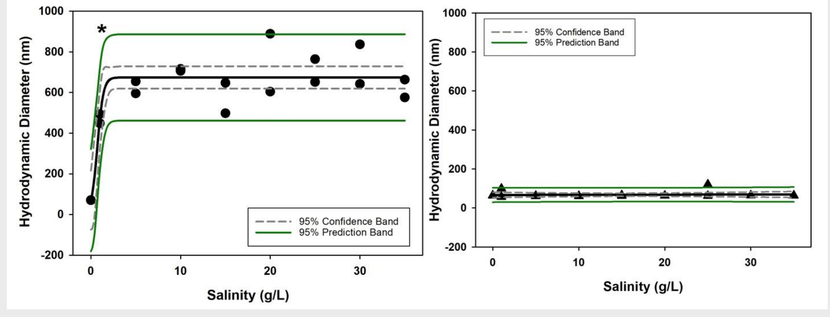


Fig. 2. Hydrodynamic diameter comparison of 50nm Polyspherex™ plain and carboxylated PMMA nanospheres in 0-35 g/L salinity gradient. Asterisk (*) represents a significant change in hydrodynamic diameter.

IMPLICATIONS FOR FATE, TRANSPORT, AND EXPOSURE

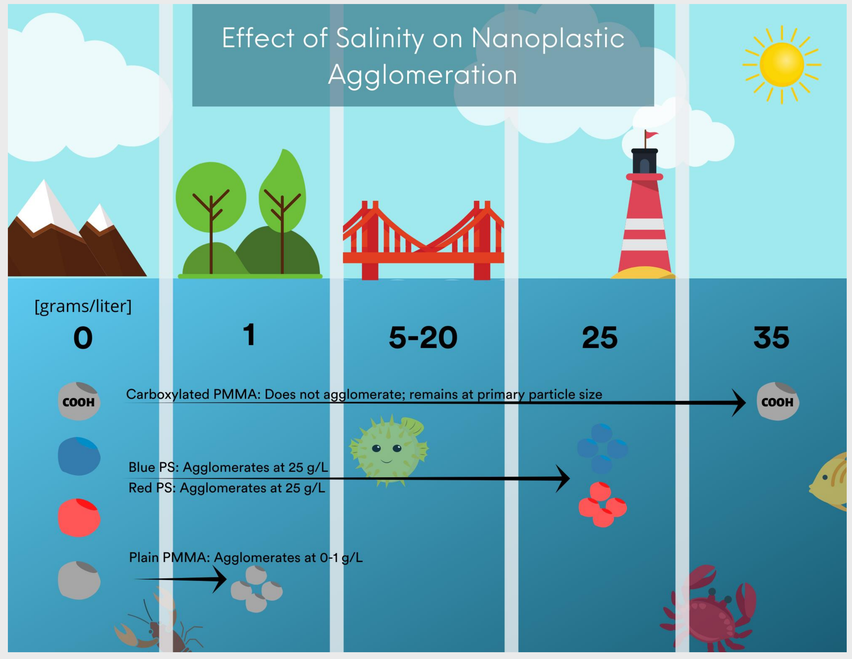


Fig. 3. Nanoplastic agglomeration behavior across experimental salinity gradients varies depending on plastic type and surface chemistry.

ACKNOWLEDGEMENTS

- National Science Foundation Growing Research Convergence (grant # 1935028)
- Pacific Northwest Consortium on Plastics
- Bryan and Stacey Harper, for being wonderful mentors!
- Ashley Renda, for making the beautiful infographic!

- 1. Koelmans A. A., Besseling, E., Shim W. J., 2015. Nanoplastics in the Aquatic Environment. Critical Review. Marine Anthropogenic Litter 325-340. DOI: 10.1007/978-3-319-16510-3_12
- 2. Hotze, E. M., Phenrat, T., Lowry, G. V., 2010. Nanoparticle Aggregation: Challenges to Understanding Transport and Reactivity in the Environment. J. Environ. Qual. 39, 1909-1924. DOI: 10.2134/jeq2009.0462