Choudhary Aniket Dnyaneshwar

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PRESENT STATUS

Integrated PhD scholar, Environmental Nanoscience Laboratory, Department of Earth Sciences, Indian Institute of Science Education and Research Kolkata, India (2019-Current).
Under supervision of Dr. Gopala Krishna Darbha, Department of Earth Sciences,IISER-K

RESEARCH INTEREST

1) Environmental Nanoscience (Understanding nanoplastics interaction with minerals in aqueous environment).

2) Aqueous Geochemistry (Geochemical modelling, fate and transport of contaminants in the environment).

3) Remediation of contaminants from the aqueous environment using eco-friendly technique.

AWARDS AND HONORS

1) Prime Minister Research Fellowship (PMRF) for PhD by Ministry of Education, Government of India (GOI). (2022)

2) Awarded student registration grant to attain the SETAC Europe 32nd Annual Meeting (2022).

3) JAM, AIR-148, (2019).

4) First prize in intercollegiate quiz competition at Annual Departmental Fest Flints, Fergusson College, Pune (2017).

PUBLICATIONS:

1) **Choudhary A**, Khandelwal N, Singh N, Tiwari E, Ganie ZA, Darbha GK. Nanoplastics interaction with feldspar and weathering originated secondary minerals (kaolinite and gibbsite) in the riverine environment. **Science of The Total Environment** 2021,151831.

2) Khandelwal, Nitin; Rajak, Jai Kishan; Singh, Nisha; Tiwari, Ekta; Ganie, Zahid Ahmad; **Choudhary, Aniket**; Darbha, Gopala (2021). "Continuous filtration of multi-metal contaminated river and groundwater using antioxidant preserved redox-sensitive nanocomposites: ultrahigh reactivity and self-sedimentation possibility". ACS ES&T Water (Accepted).

3) E. Tiwari, N. Singh, N. Khandelwal, Z.A. Ganie, **A. Choudhary** and G.K. Darbha (2021). Impact of nanoplastic debris on the stability and transport of metal oxide nanoparticles in the sub-surface. Chemosphere In Peer-review.

WORKSHOPS/EXIBHITION/Conferences:

1) Represented Earth Sciences department in 24th National Science Exhibition, Kolkata.

2) Goldschmidt Conference 2022, Hawaii (Oral Presentation)

3) RSC, #EnvChem2022 conference, York, UK (Oral Presentation)

4) Poster presentation and demonstration of geological samples at 'Restless Earth Exhibition' organized by JIVIDHA, Pune.

5) Poster presentation at CONVERGENCE 2022, Department of Earth Sciences, IISER-K

Experience/Membership:

1) Teaching assistant (TA) of course "Introduction to Environment Science". (2022).

2) Royal society of chemistry (RSC) member. (2022-Present).

3) Society of Environmental Toxicology and Chemistry (SETAC) member. (2021–Present).

4) IISER-K Outreach committee member. (2021- Present).

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Nanoplastics interaction with feldspar and weathering originated secondary minerals (kaolinite and gibbsite) in the riverine environment

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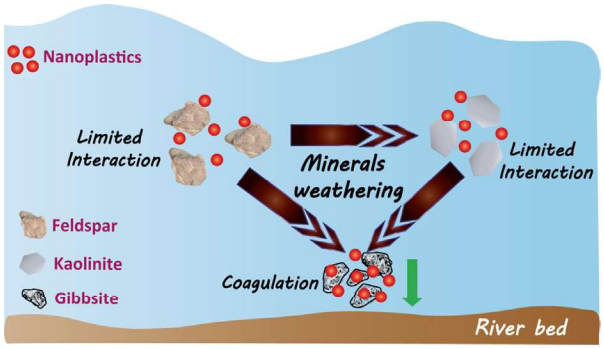
HIGHLIGHTS

- Secondary mineral gibbsite interacts more with nanoplastics (NPs).
- Electrostatic repulsion limits NPs interaction with feldspar and kaolinite.
- Point of zero charge in NPs-gibbsite bimodal system resulted in their coagulation.
- Interfering ions, pH, and humic acid played vital role in NPs-minerals interaction.
- Surface area, complexation, charge & amorphosity governs minerals-NPs interaction.

GRAPHICAL ABSTRACT



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ABSTRACT

Despite the massive accumulation of nanoplastics (NPs) in the freshwater system, research so far has highly focused on the marine environment. NPs interaction with mineral surfaces can influence their fate in freshwater, which will further impact their bioavailability and transport to the oceans. Current work focuses on understanding NPs interaction with weathering sequence of minerals in freshwater under varying geochemical conditions. Primary mineral feldspar and weathering originated secondary minerals, i.e., kaolinite and gibbsite, were investigated for interaction with NPs under batch mode under relevant environmental conditions. Minerals-NPs interaction was also investigated in natural water samples. Results showed that the amorphous nature, small particle size, and positive surface charge of gibbsite resulted in multi-fold sorption of NPs (108.1 mg/g) compared to feldspar (7.7 mg/g) and kaolinite (11.9 mg/g). FTIR spectroscopy revealed hydrogen bonding and complexation as major players in gibbsite-NPs interaction suggesting the possibility of their co-precipitation. The continuous adsorption-desorption and limited sorption capacity of feldspar and kaolinite can be attributed to their negative surface charge, larger size, crystalline nature, and physical sorption. Therefore, both minerals may co-transport and enhance the mobility of NPs.

1. Introduction

The existence of plastic and its mismanagement are of a globally growing concern due to its increased production in the last 50 years (Milios et al., 2018). Their high durability and strength make them

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