

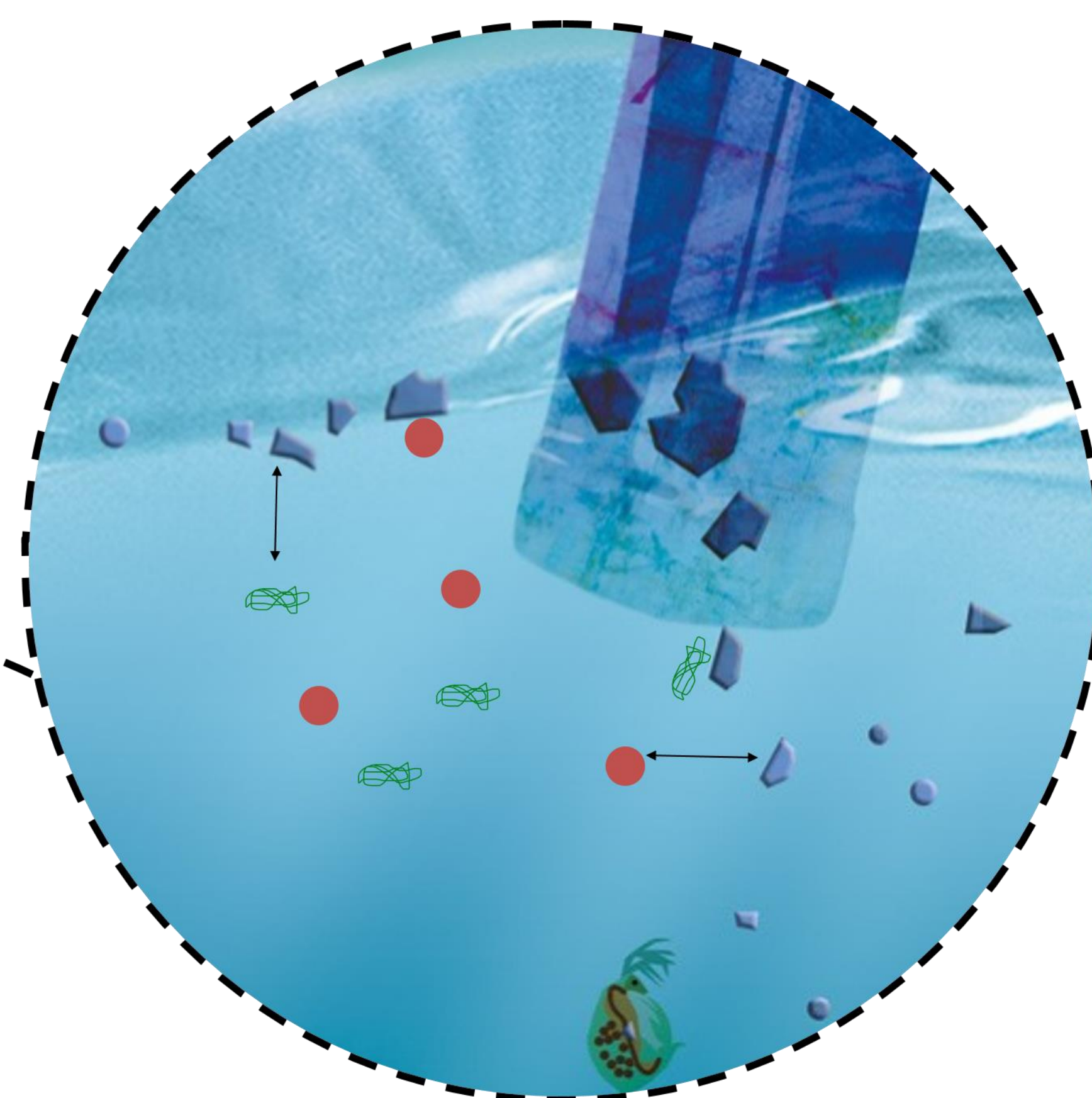
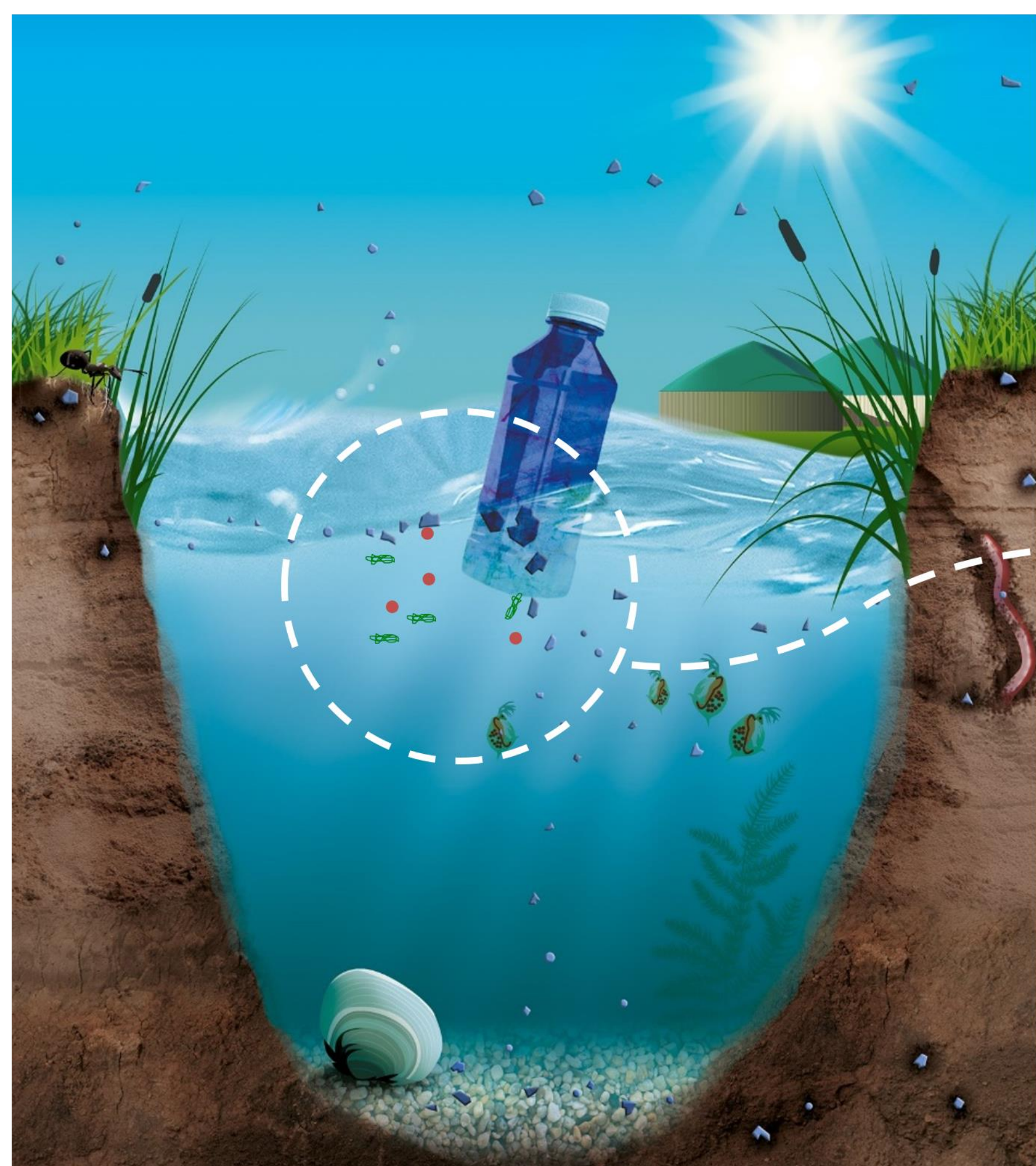
# The influence of iron (oxyhydr)oxides on the surface properties of polystyrene microplastics in aquatic environments [334127]



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CRC 1357 Microplastic



Natural organic matter  
 Metal hydroxides

1.

- Microplastics (MP) in the environment are expected to undergo various processes associated with natural colloids, e.g. aggregation
- Aggregation and adsorption of natural water constituents onto the MP surface might affect the surface properties or transport behavior of MPs

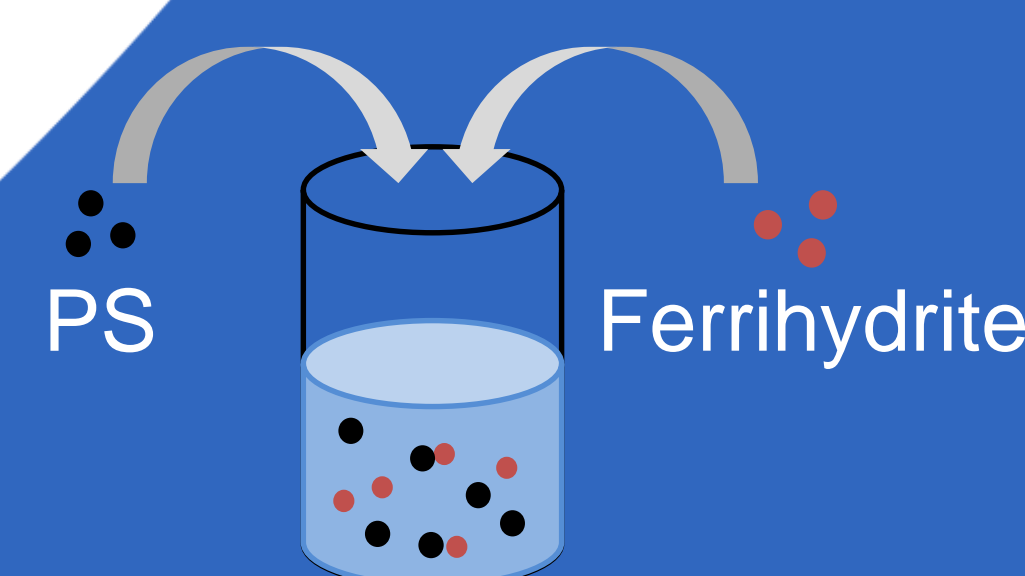
2.

### Hypothesis

The surface properties of polystyrene (PS) MP will be controlled by interactions with iron (oxyhydr)oxides which are abundant in aquatic environments.

3.

Spherical 1  $\mu\text{m}$  PS particles (10 mg/L) were allowed to react with ferrihydrite (10 mg/L), a Fe(III) oxyhydroxide, which occurs naturally in water, sediments, and soils.



4.

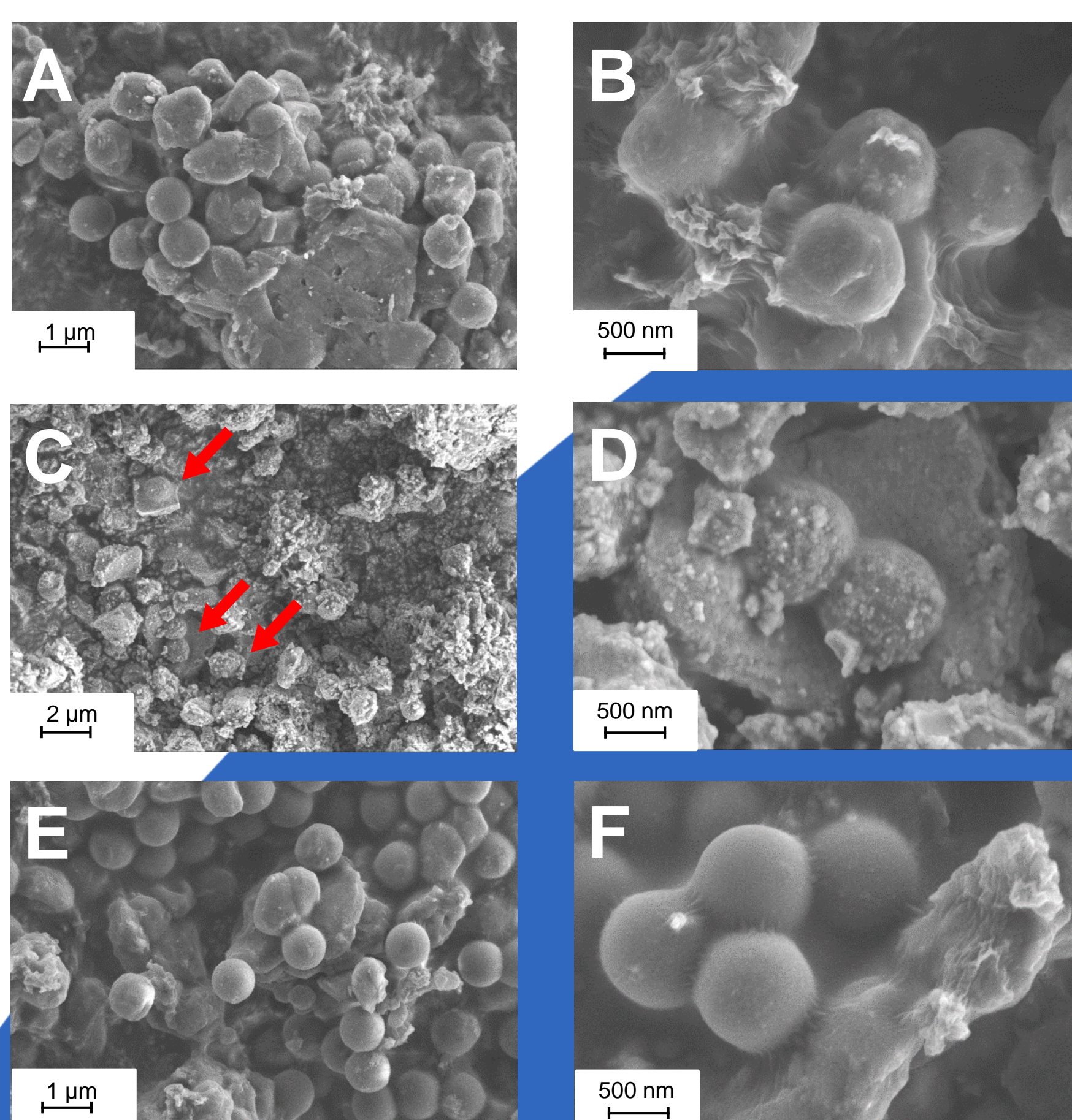


Fig. 1 SEM images of samples of PS and ferrihydrite at pH 3 (A+B), pH 7 (C+D), and pH 11 (E+F).

Highest adsorption of ferrihydrite onto the PS surface was observed at pH 7 - the entire PS surface was covered with ferrihydrite.  
At pH 3 and 11, only few ferrihydrite particles were found on the PS surface.

5.

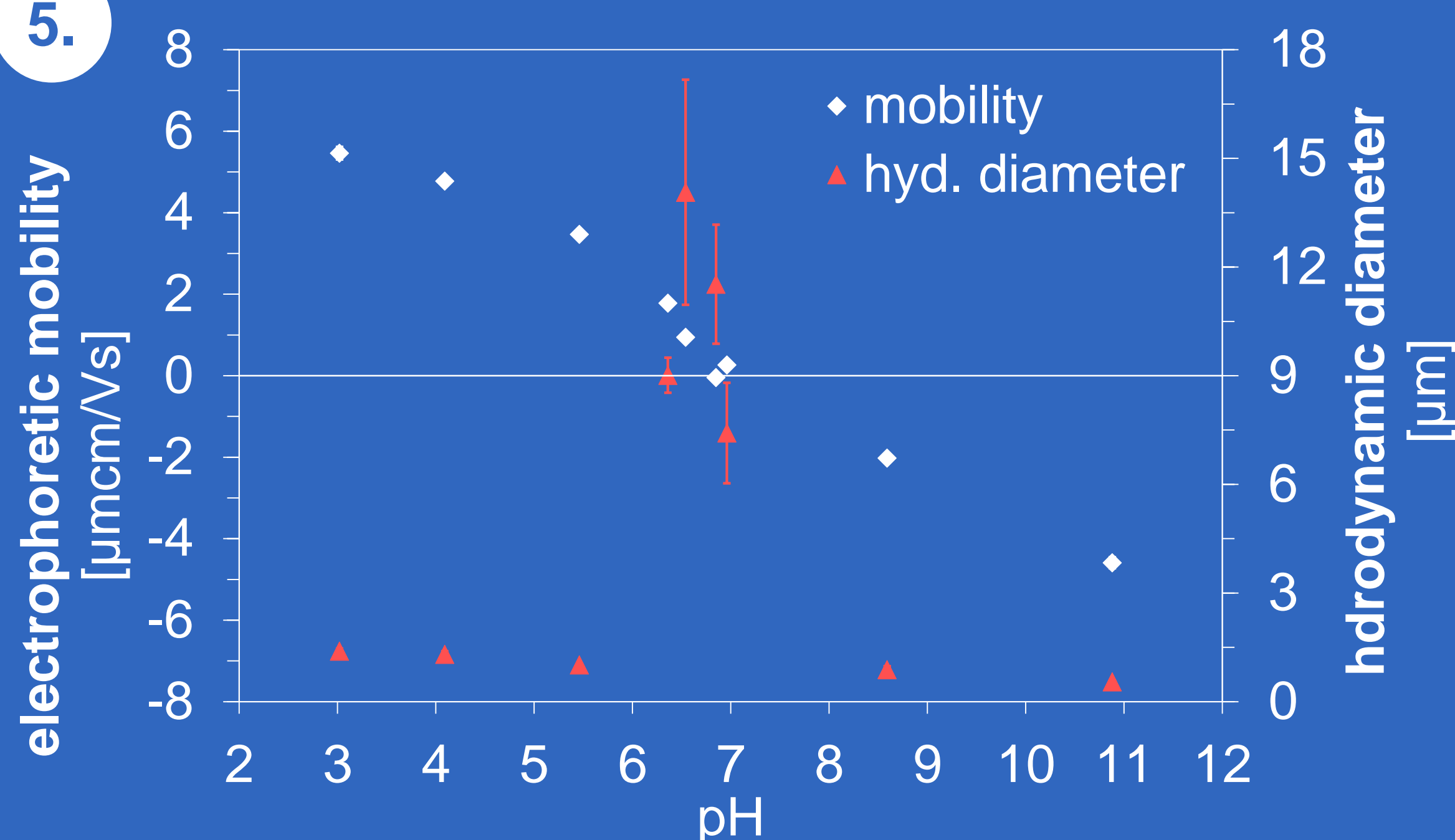


Fig. 2 Electrophoretic mobility and hydrodynamic diameter of PS particles reacted with Ferrihydrite.

The point of zero charge was at neutral pH value. At this pH the hydrodynamic diameter of the samples increased substantially.

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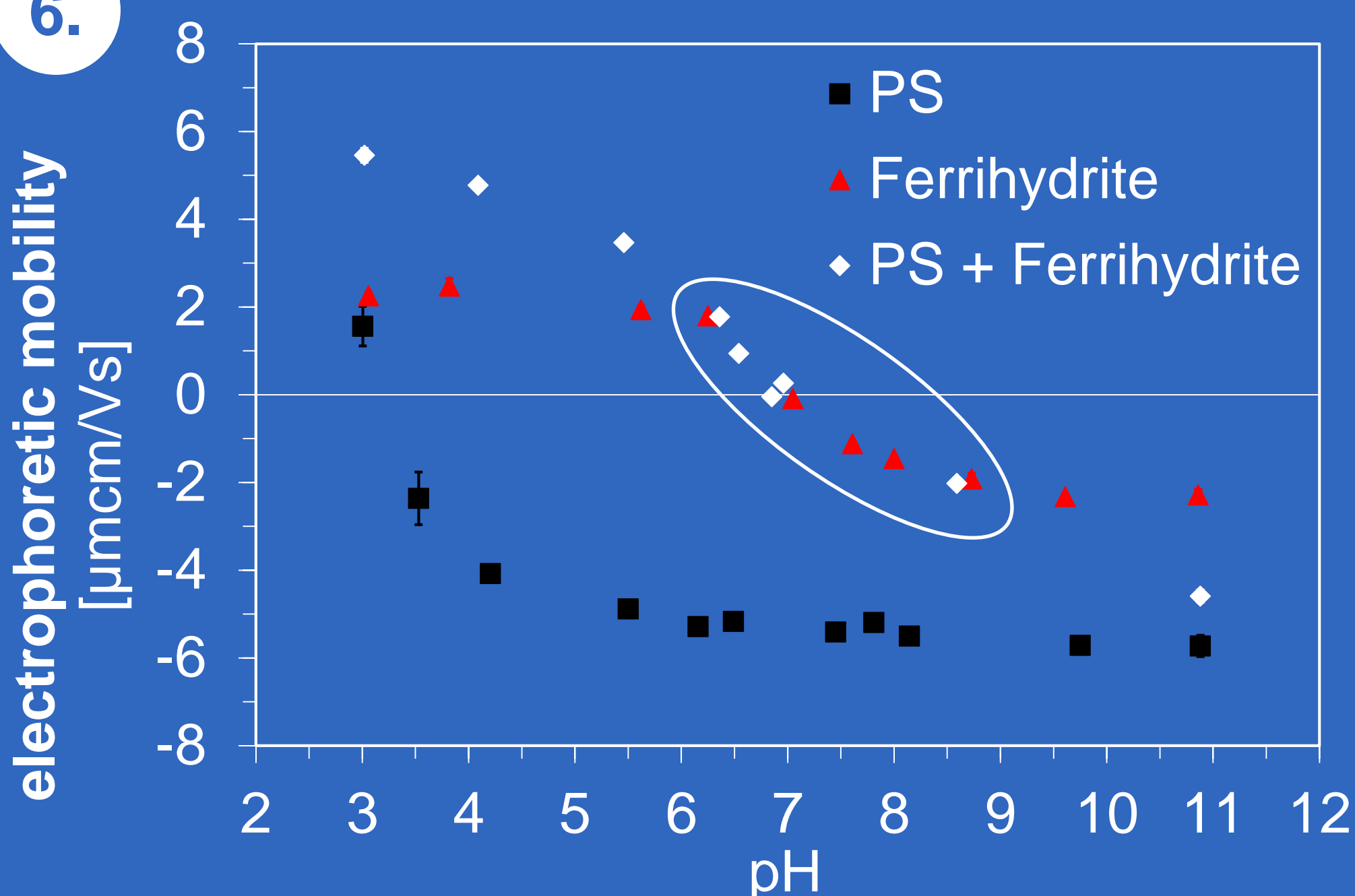


Fig. 3 Electrophoretic mobilities of PS, Ferrihydrite, and PS particles reacted with Ferrihydrite.

Characteristic neg. surface charge of PS completely disappeared at neutral pH values when PS and ferrihydrite were mixed in equal masses. Instead, the surface charge of the mixture was almost identical to those of ferrihydrite (pH 6 - 8.5).

7.

### Conclusion

The interactions of MP particles with other particles in the environment are of great importance. In fact, under certain conditions, the surface properties of PS particles were described by ferrihydrite, which covered the entire PS surface.