

Loading and Ion Exchange Kinetics of Zirconium Phosphate Nanoplatelets

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Background

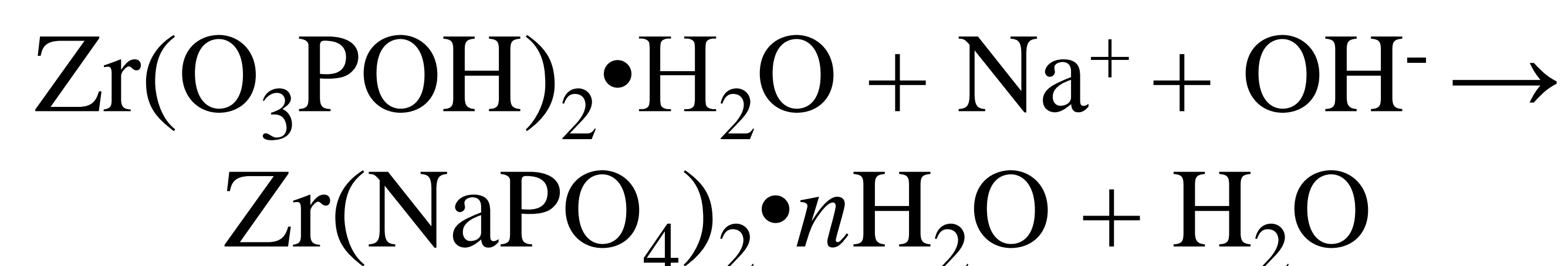
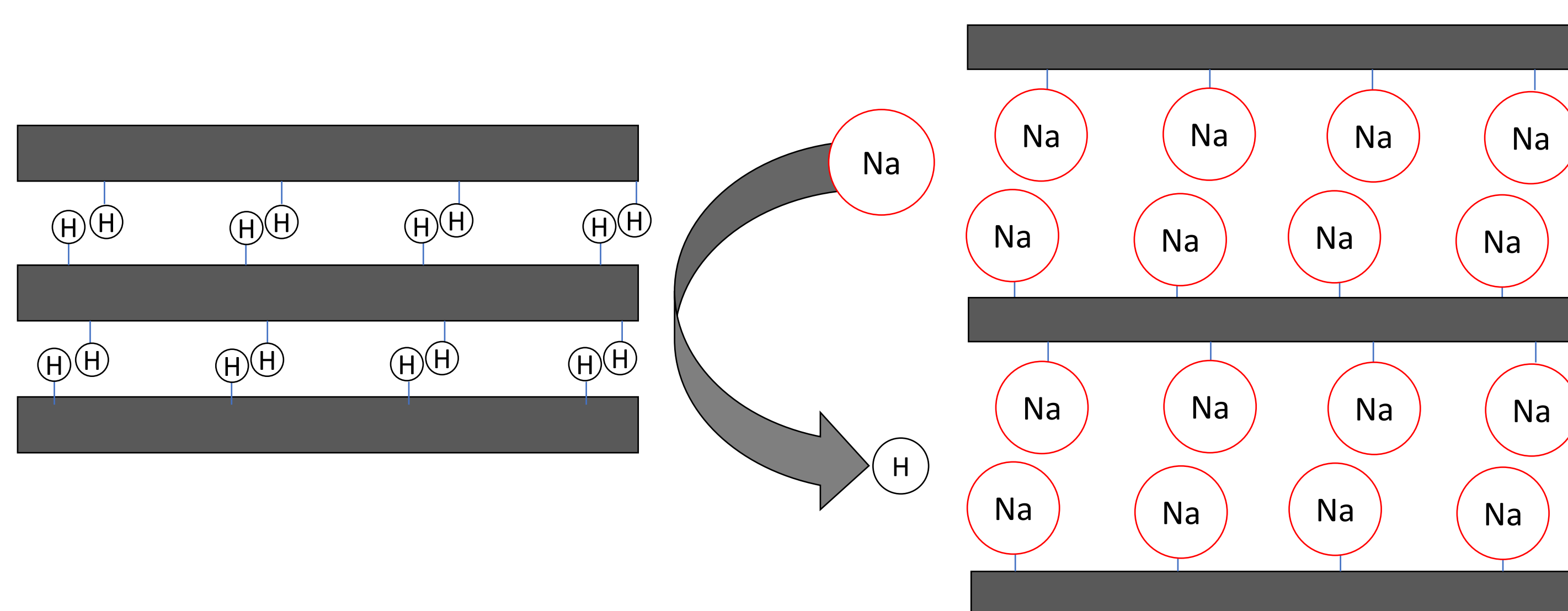
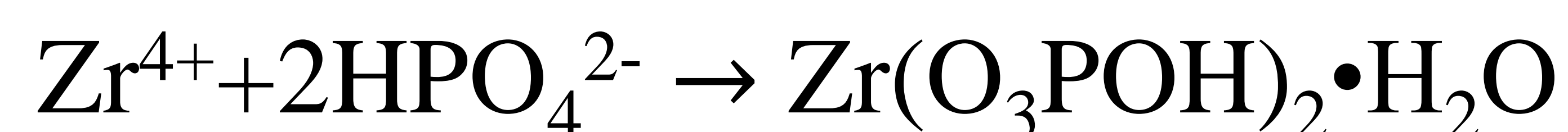
α -Zirconium phosphate (α -ZrP) is a layered ion exchange material with two exchangeable protons that can be replaced with other positively charged ions. This property and others provide the potential for it to be a radionuclide vehicle, with promising medical applications, both on the diagnostic and therapeutic sides of treatment.

The exchangeable protons can be replaced with Na ions, increasing the interlayer distance from 7.6 Å to 12.2 Å¹. This project explores the synthesis of α -ZrP, the conversion to the sodium phase, and further exchange with other metal ions.

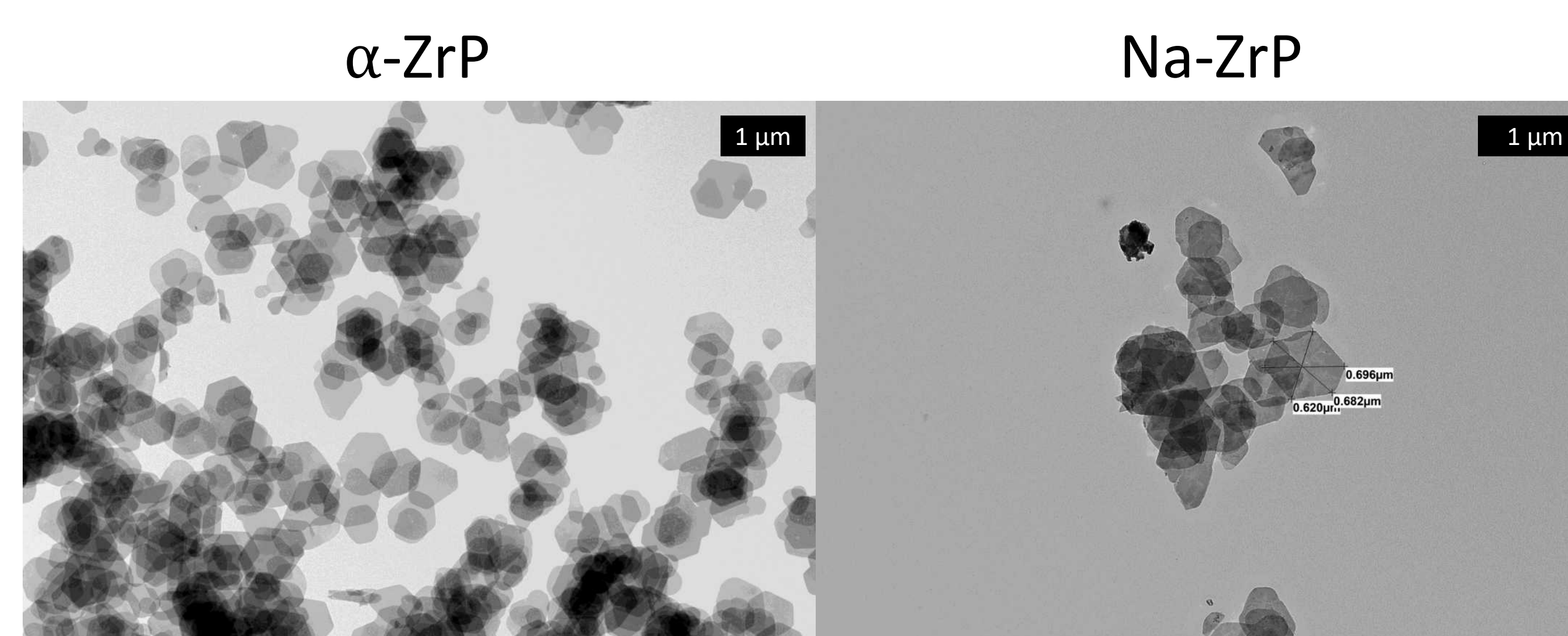
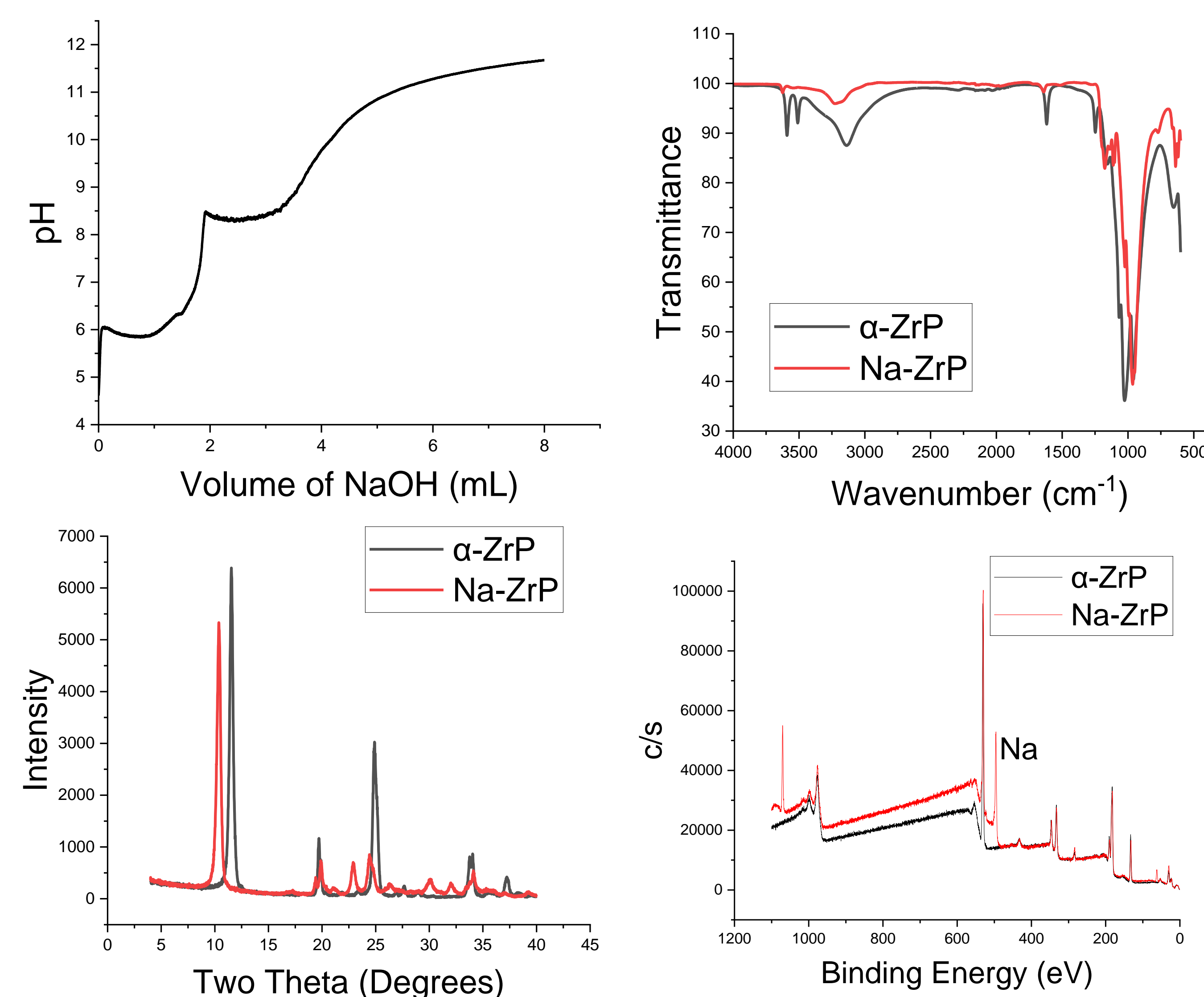
Hypothesis

When the exchangeable protons of α -ZrP are replaced with Na⁺ ions, the increased interlayer spacing will facilitate rapid ion exchange with other metal ions.

Synthesis of α -ZrP and Na-ZrP



Characterization

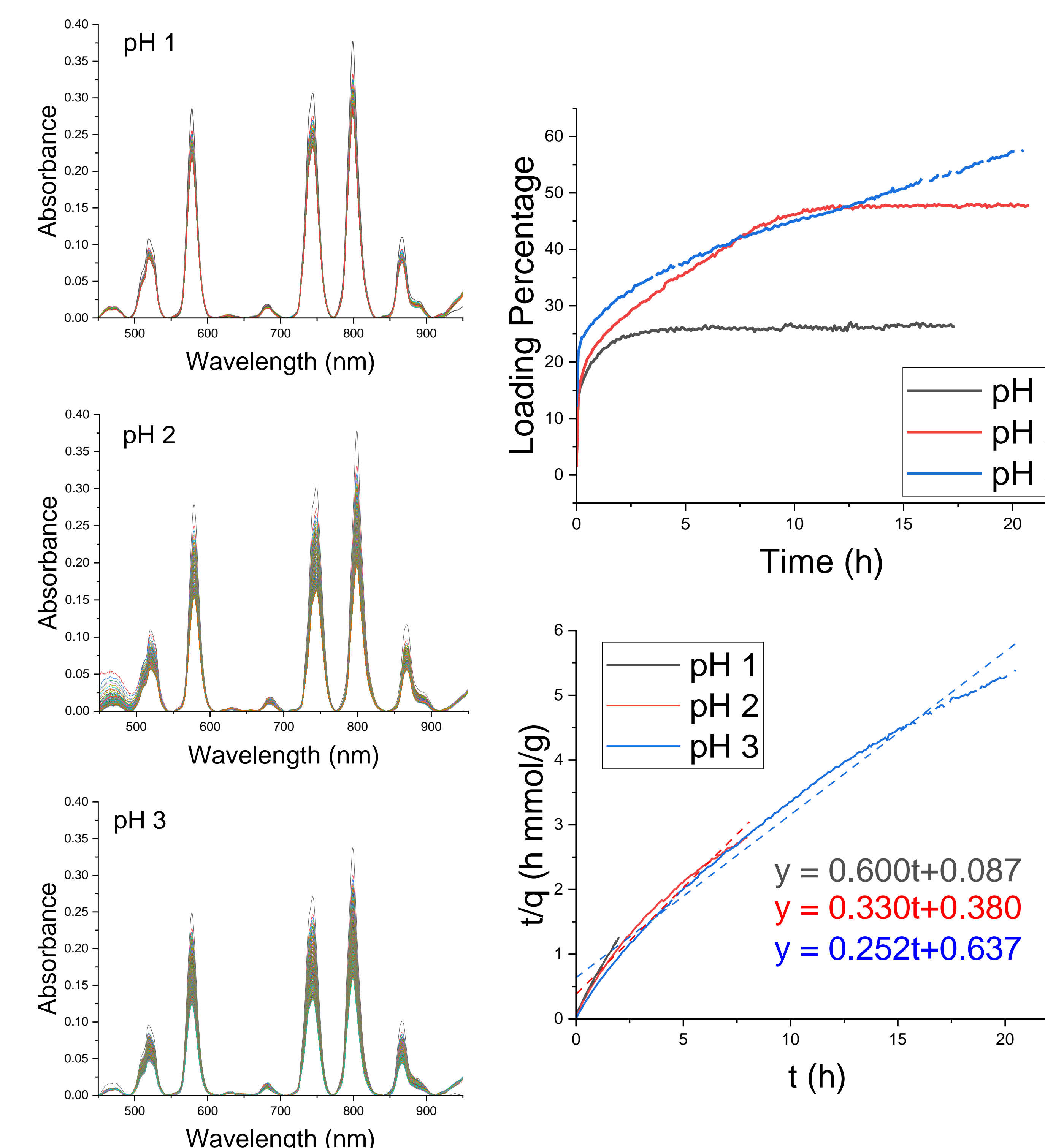


Acknowledgements

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Ion Exchange

- Acidic Nd³⁺ ion solutions are produced with pH values ranging from 1–3.
- Na-ZrP is added to the solution and absorbance is recorded over time through UV-Vis.



Future Directions

- Perform further ion exchange experiments with other positively charged metal ions and radionuclides as the exchangeable material

References

- Einkauf, J. D. *et al.* *Ion-Exchange Kinetics*. **2020**, 38:6, 612-628.