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IONIC LIQUID
LABORATORIES
QUILL



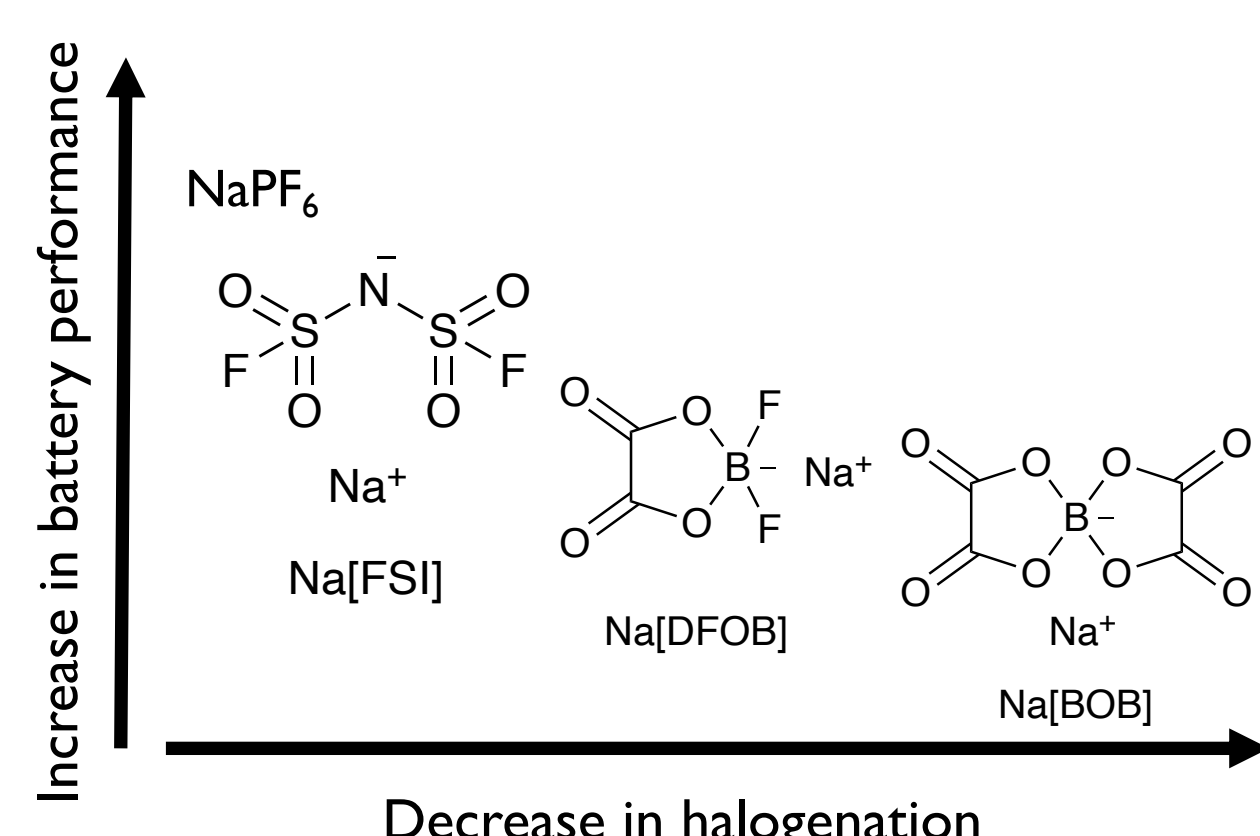
The synthesis and characterisation of borate anions for functional applications

Haris Amir, Małgorzata Swadźba-Kwaśny and John D. Holbrey

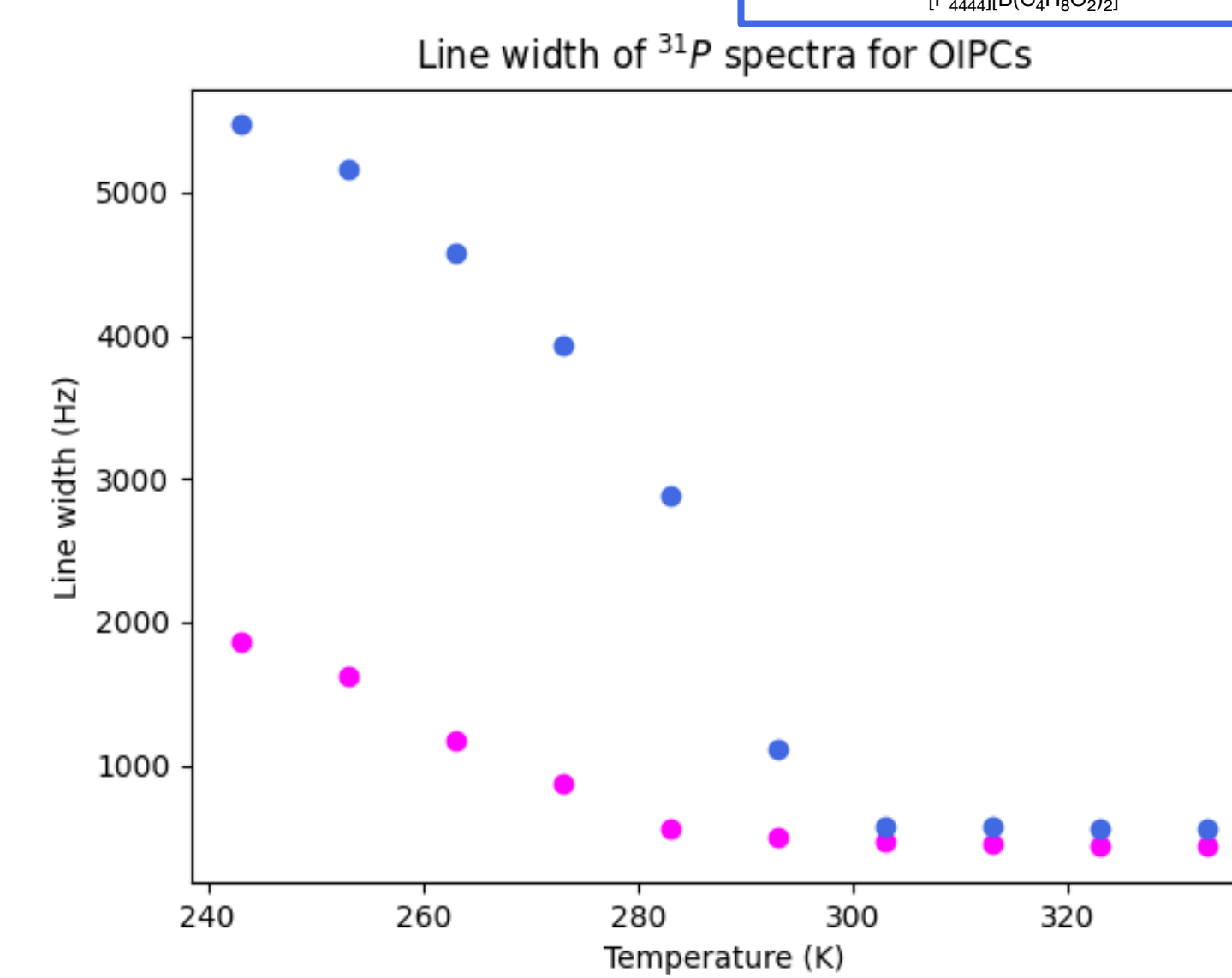
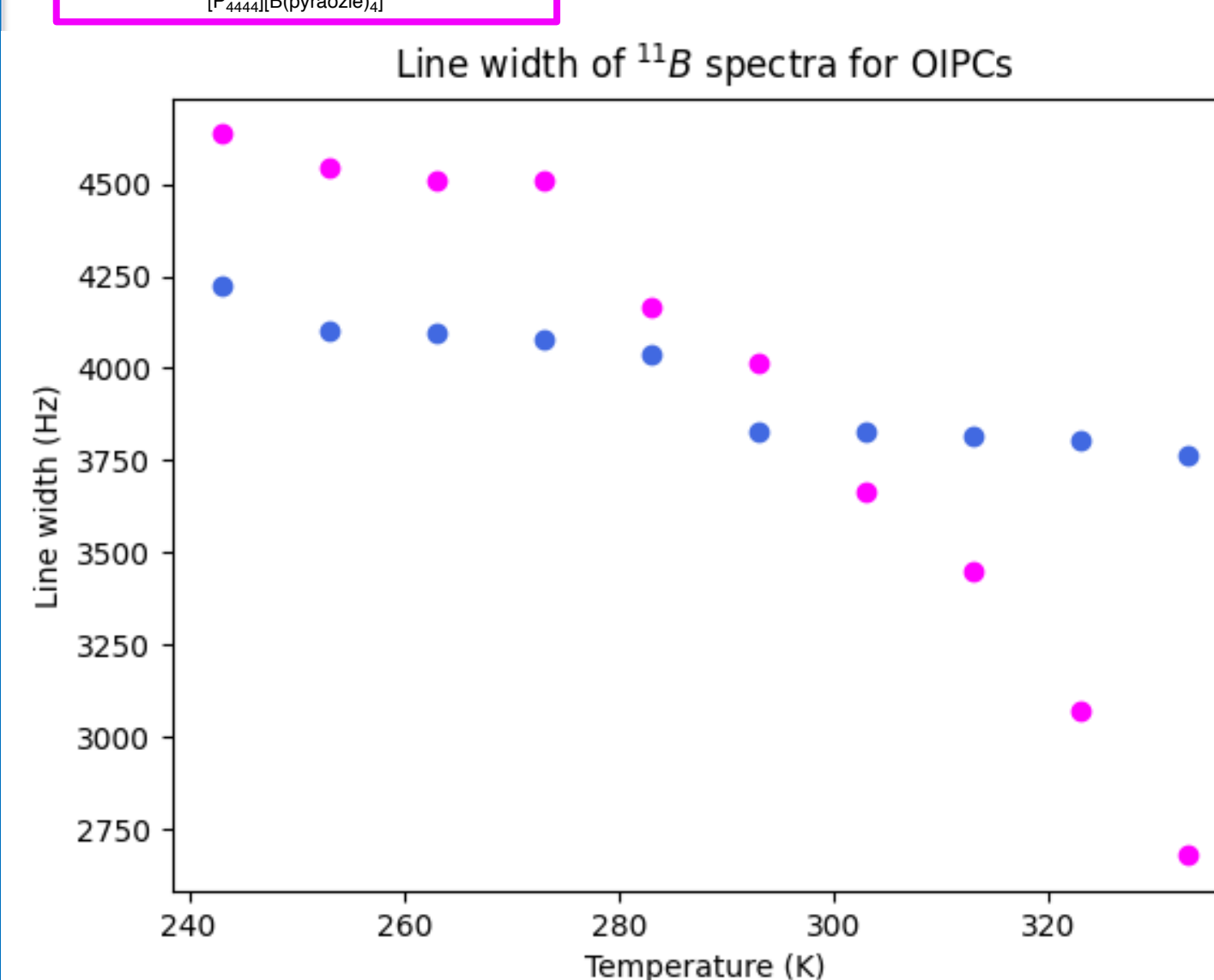
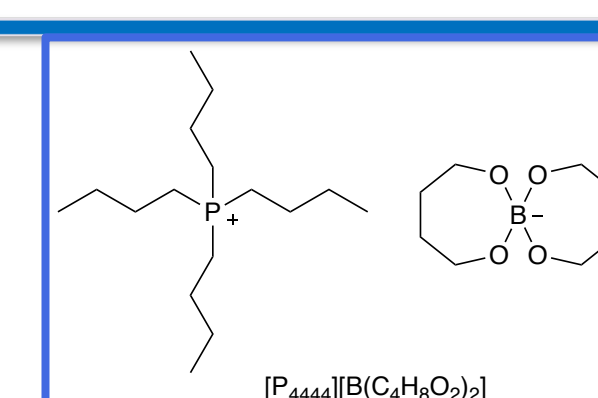
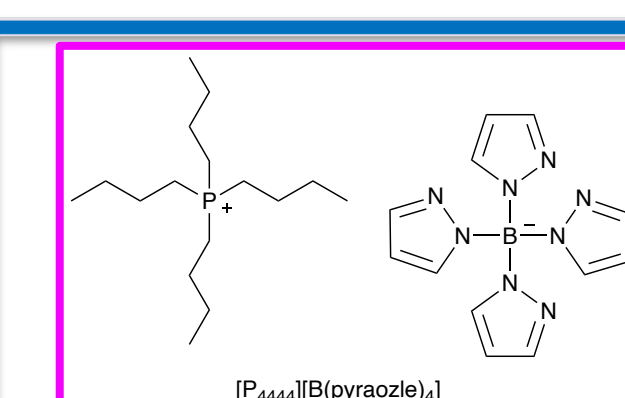
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Future of batteries¹⁻³

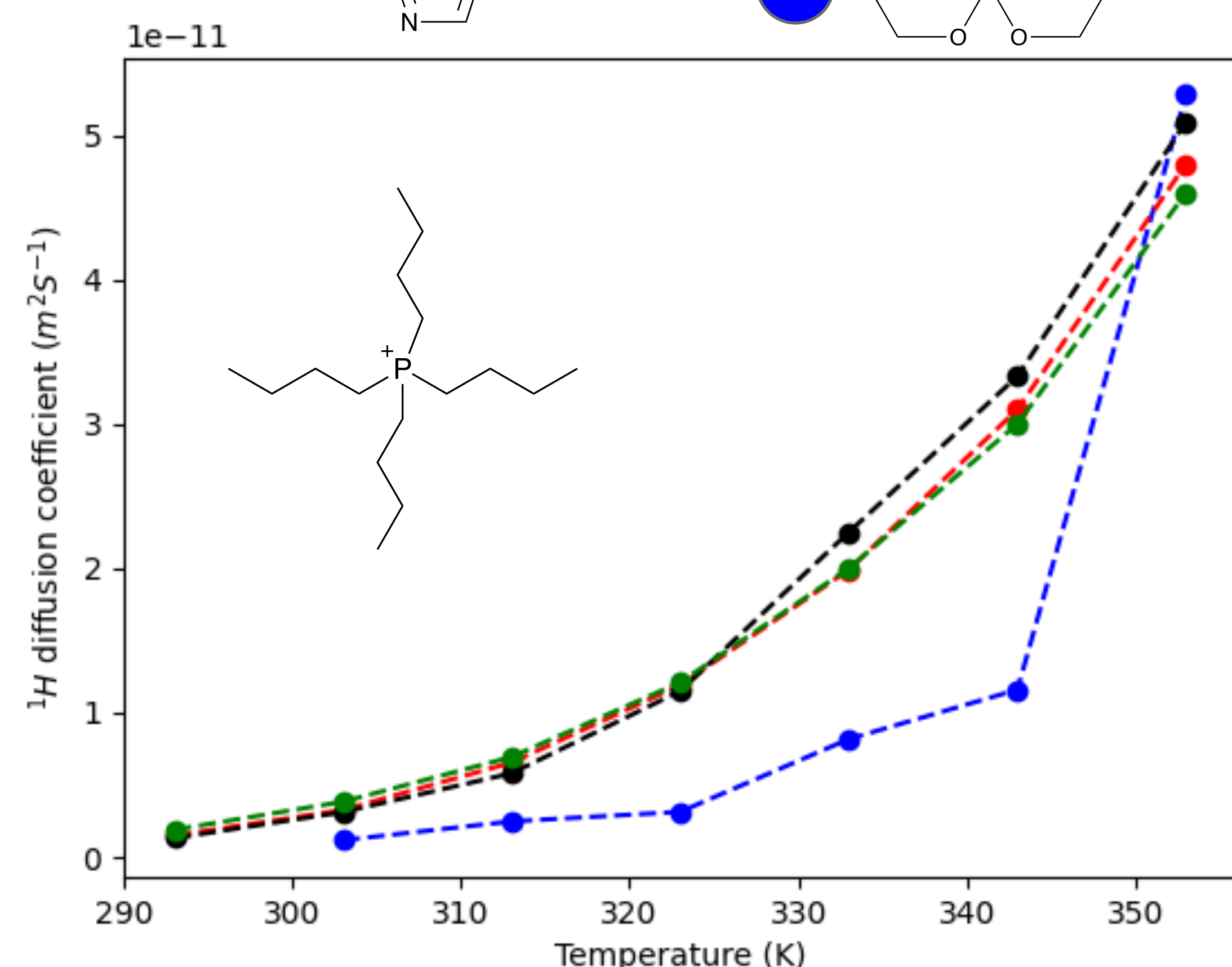
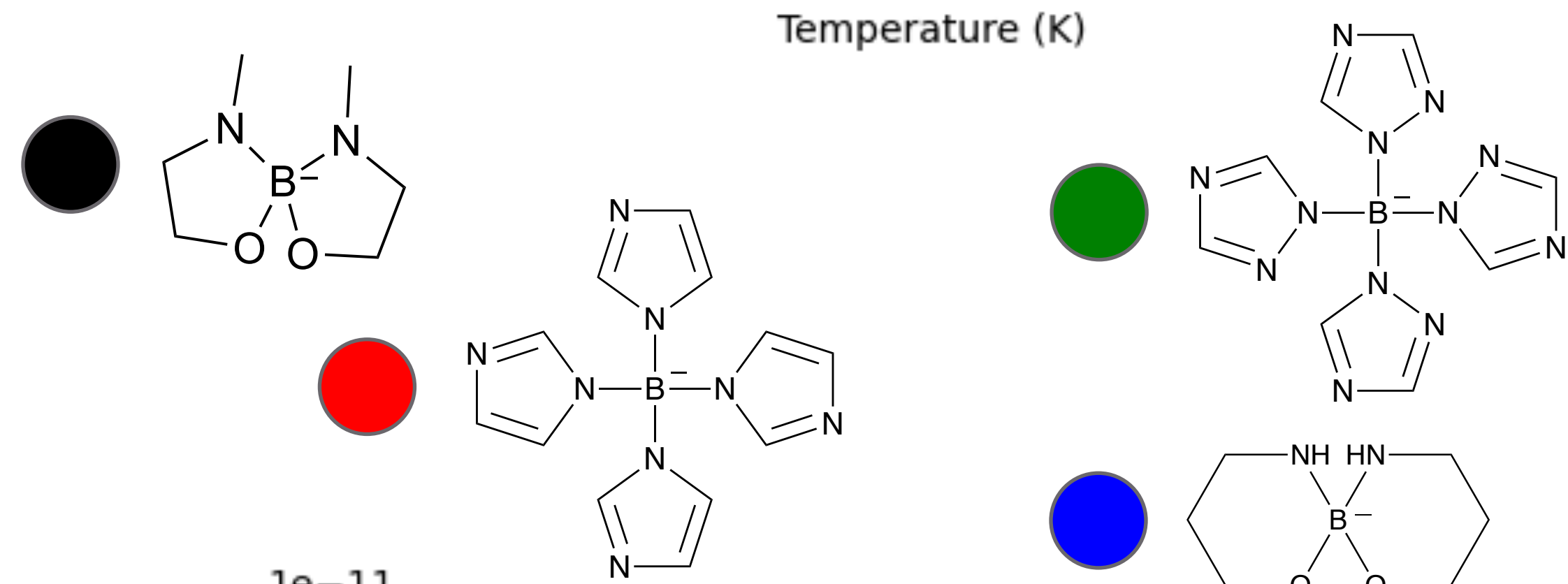
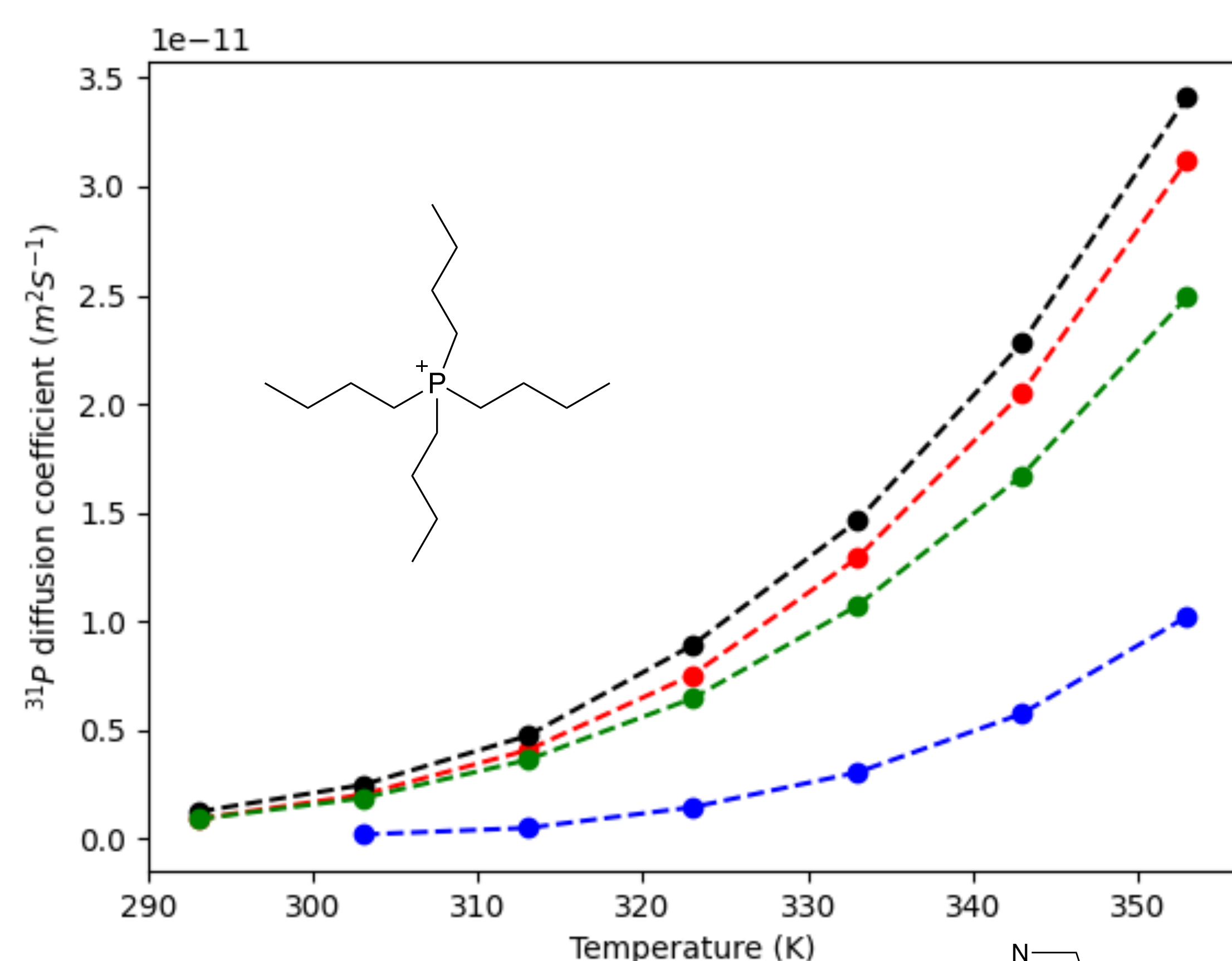
- Limited lithium availability – price increase (\$13,000/tonne as of June 2024)
- Sodium ion battery (SIB) best candidate (\$2544/tonne)
- Sodium borates looked at as greener alternatives



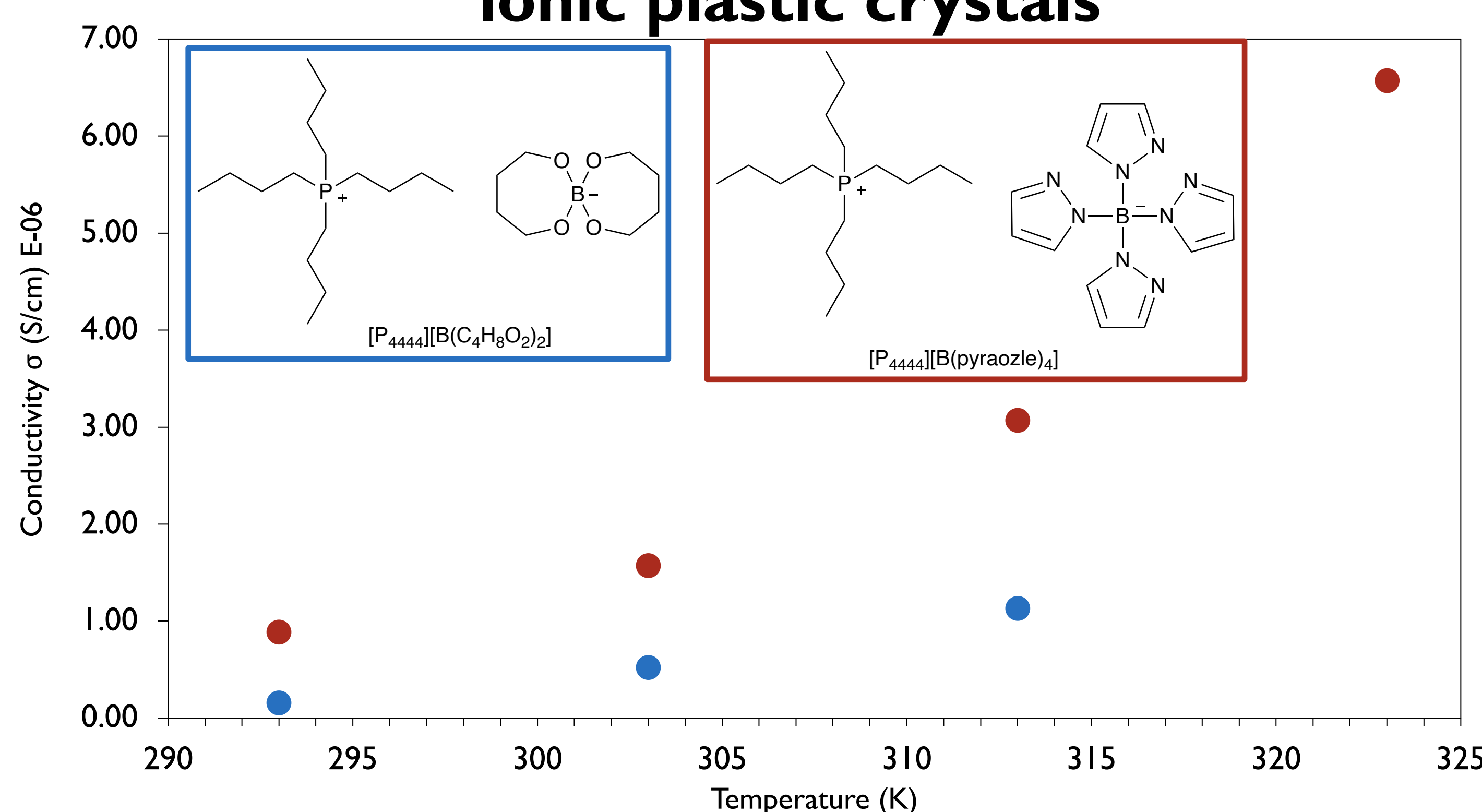
Dynamics of OIPCs



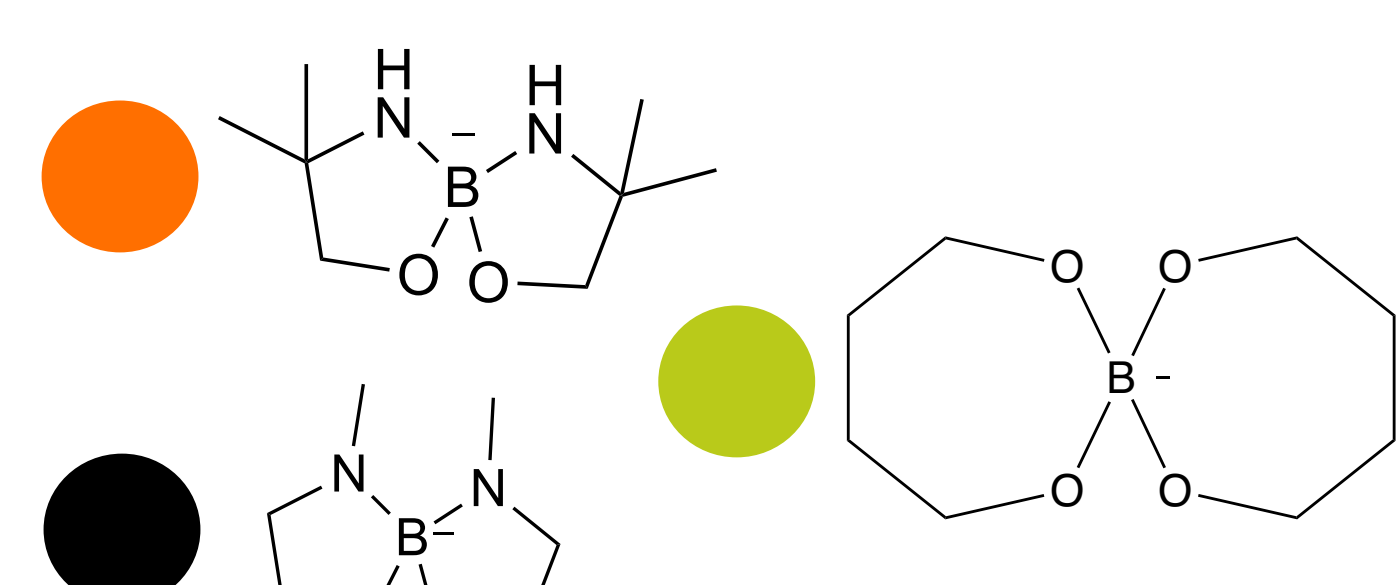
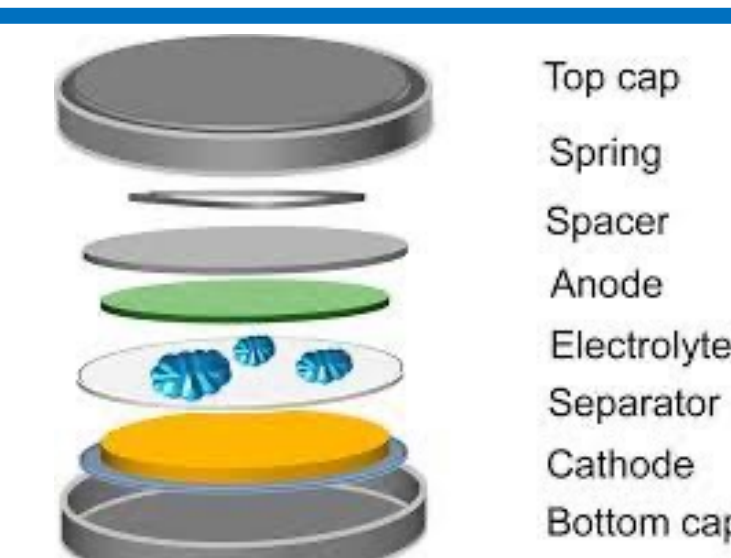
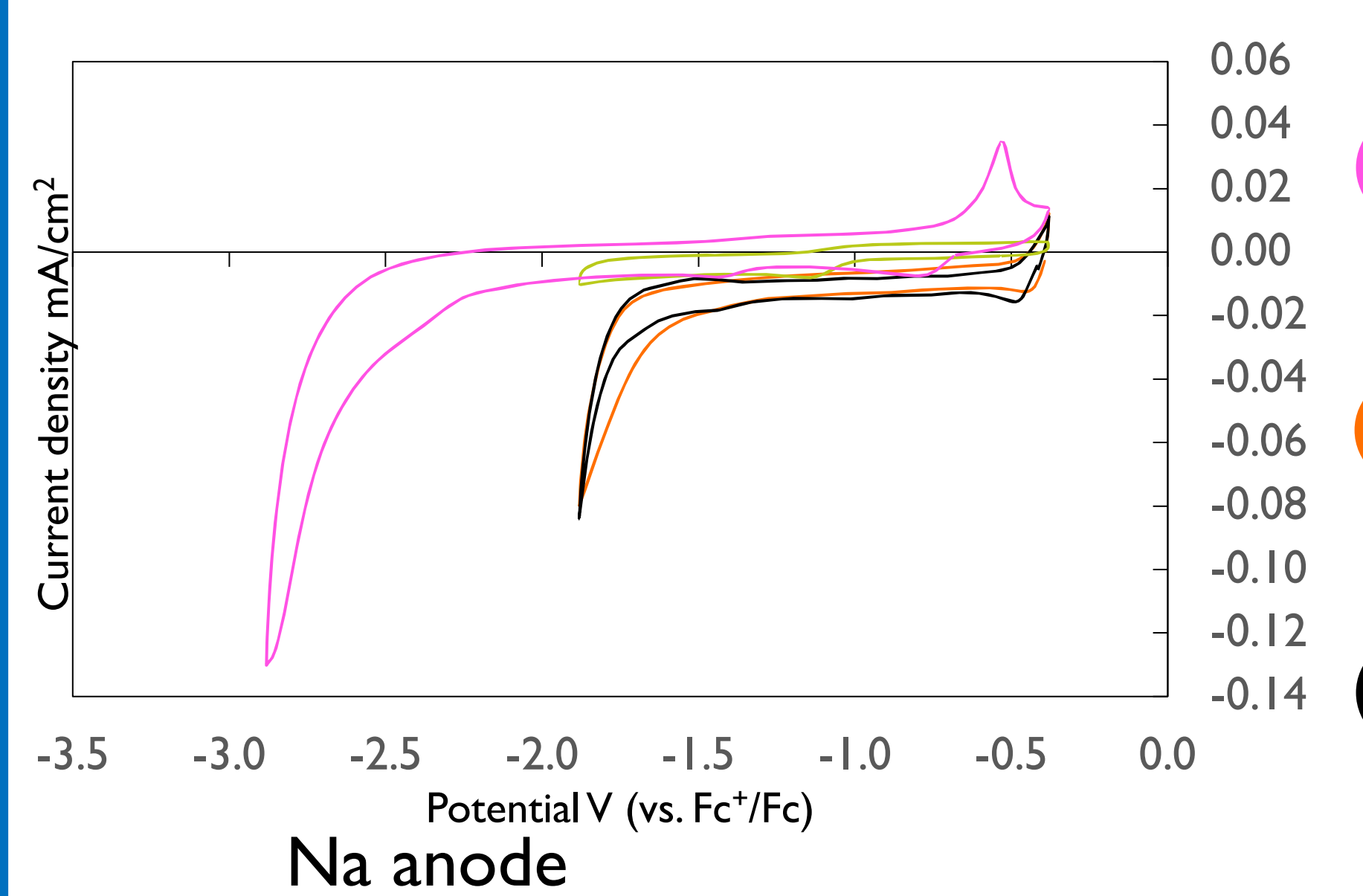
Diffusion coefficient of the cation and anion in [P₄₄₄₄]⁺ based ionic liquids



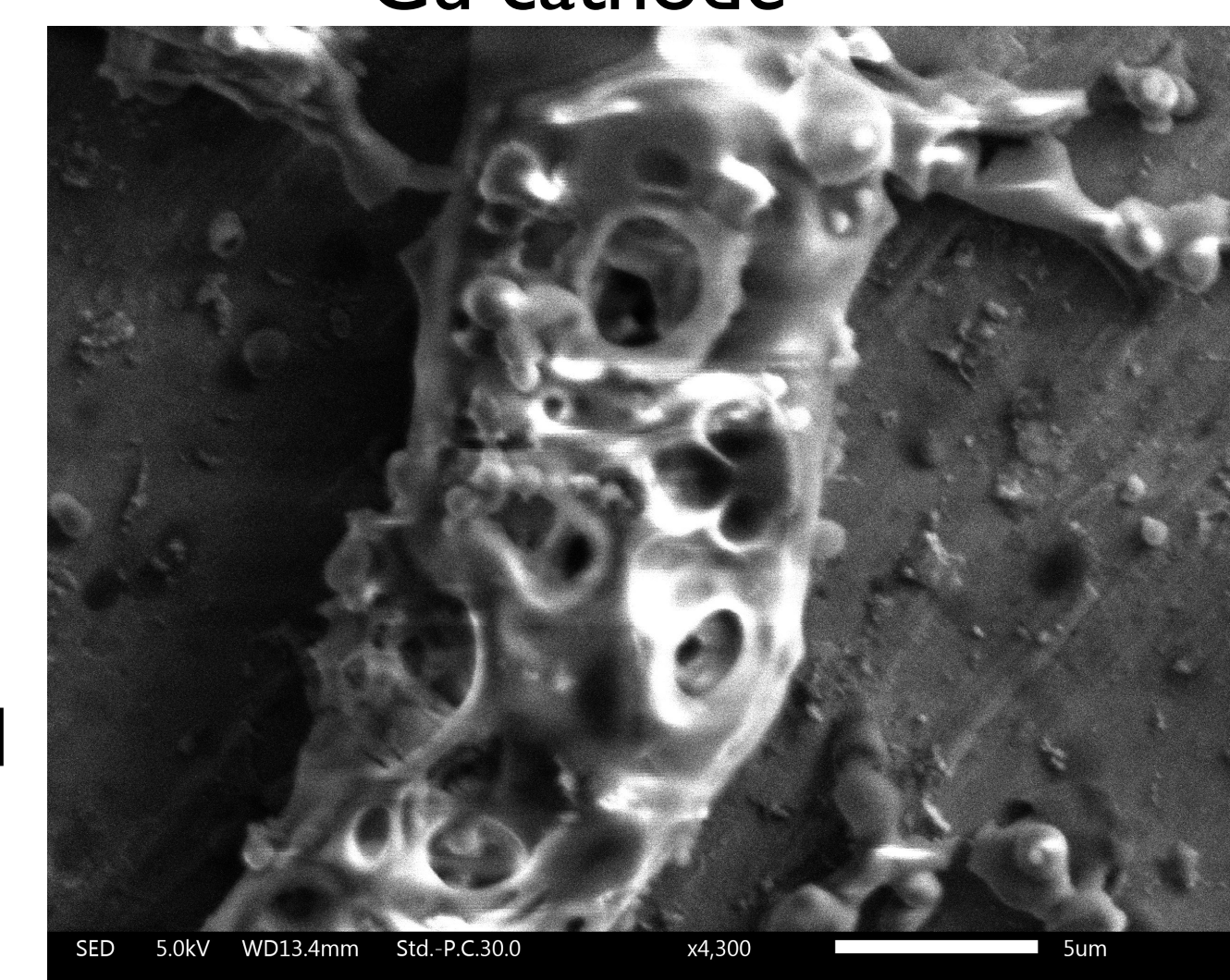
Conductivity of [P₄₄₄₄]⁺ based organic ionic plastic crystals



Reduction of Na salts

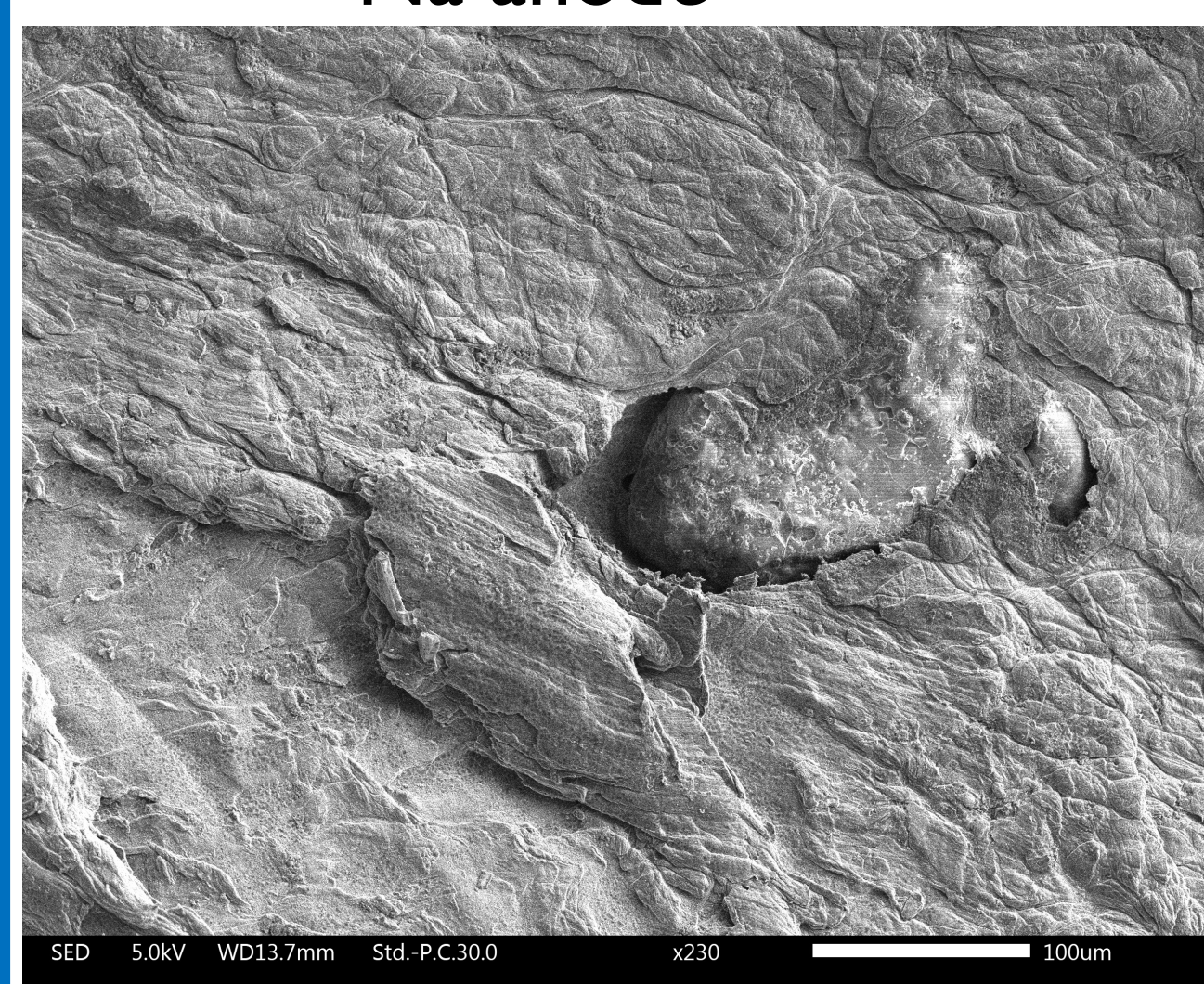
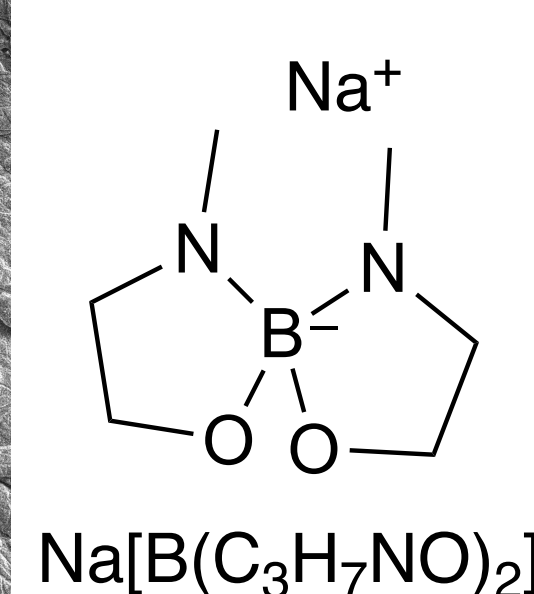


Cu cathode



Cu electrode N 7 %, O 18 %, C 8 %, Na 9 %, Cu 58 %

SEM



Na electrode O 35 %, C 10 %, Na 55 %

References:

- J.-Y. Hwang, S.-T. et al., *Chem Soc Rev*, 2017, **46**, 3529–3614.
- A. Ponrouch, et al., *Energy Environ Sci*, 2012, **5**, 8572.
- J. Chen, et al., *Chem Commu*, 2015, **51**, 9809–9812.

Acknowledgements:

Prof. Maria Forsyth
Dr Mega Kar
Prof. Michel Armand

Dr Ajit Kumar
Ms Margaux Guiraud
Mr Sam McCalmont

