

## draw your own zeolite-based sensor

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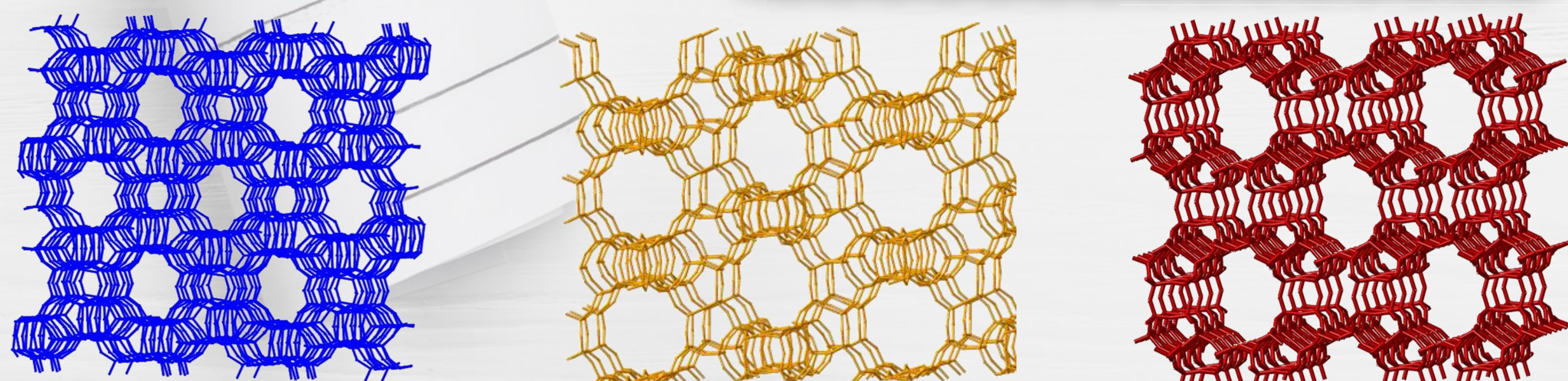
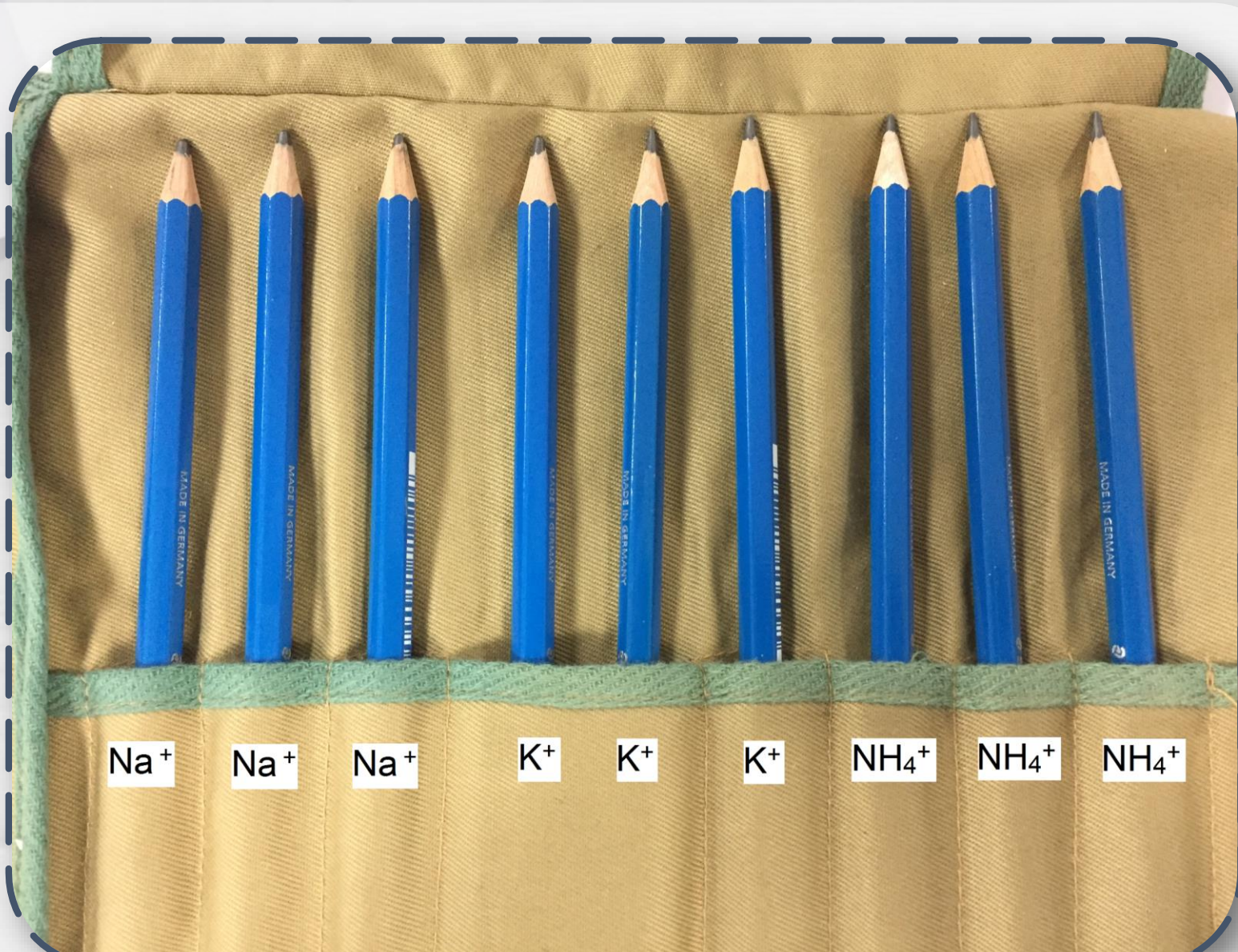


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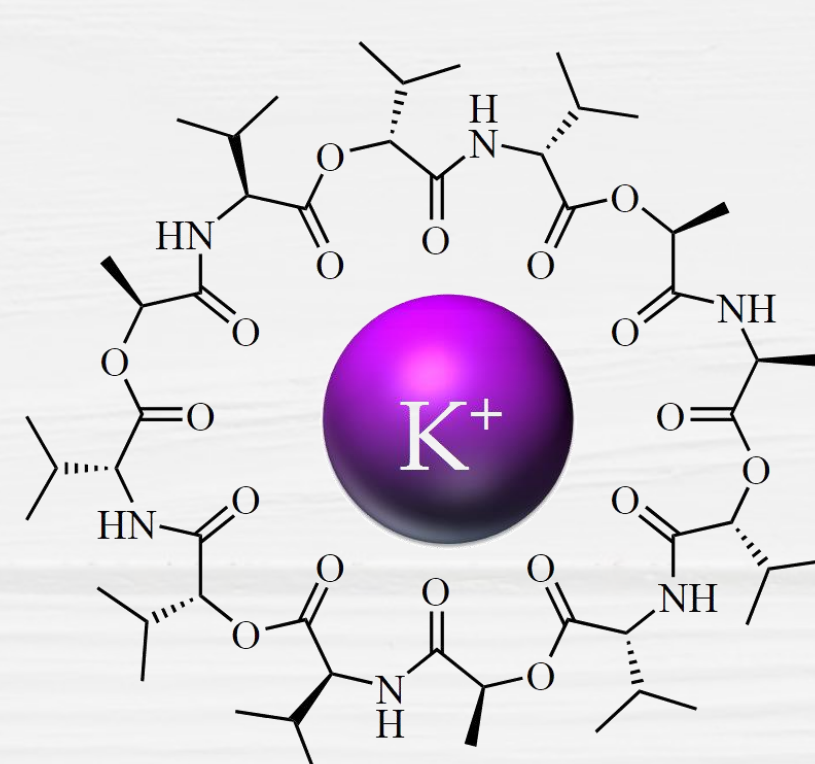
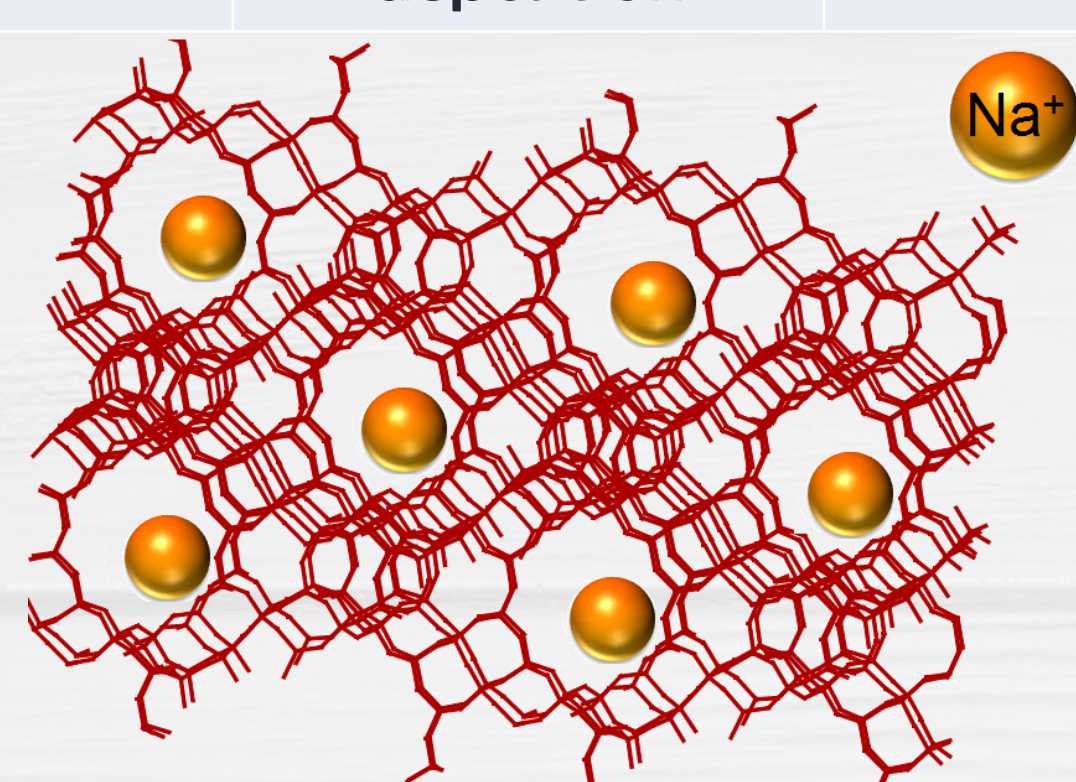
### Introduction

- Citizen Science
- Simple, cheap and robust sensor
- Ion-selective electrode (ISE)
- $EMF = E^{\circ} + \frac{2.303RT}{z_i F} \log a_i$
- ISE: Problems with long-term, thermo- and photo- sensitivity
- Zeolites are highly crystalline microporous aluminosilicates
- Zeolites are stable over a long period of time
- Zeolites can be used to prepare pencils



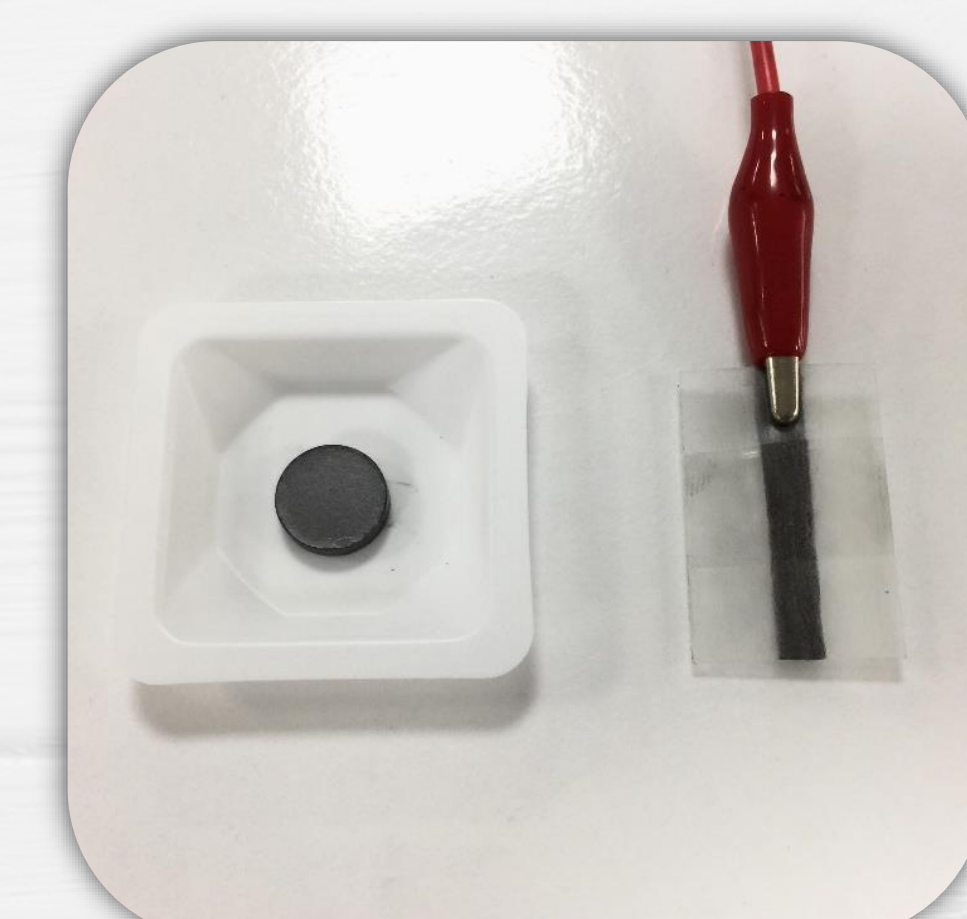
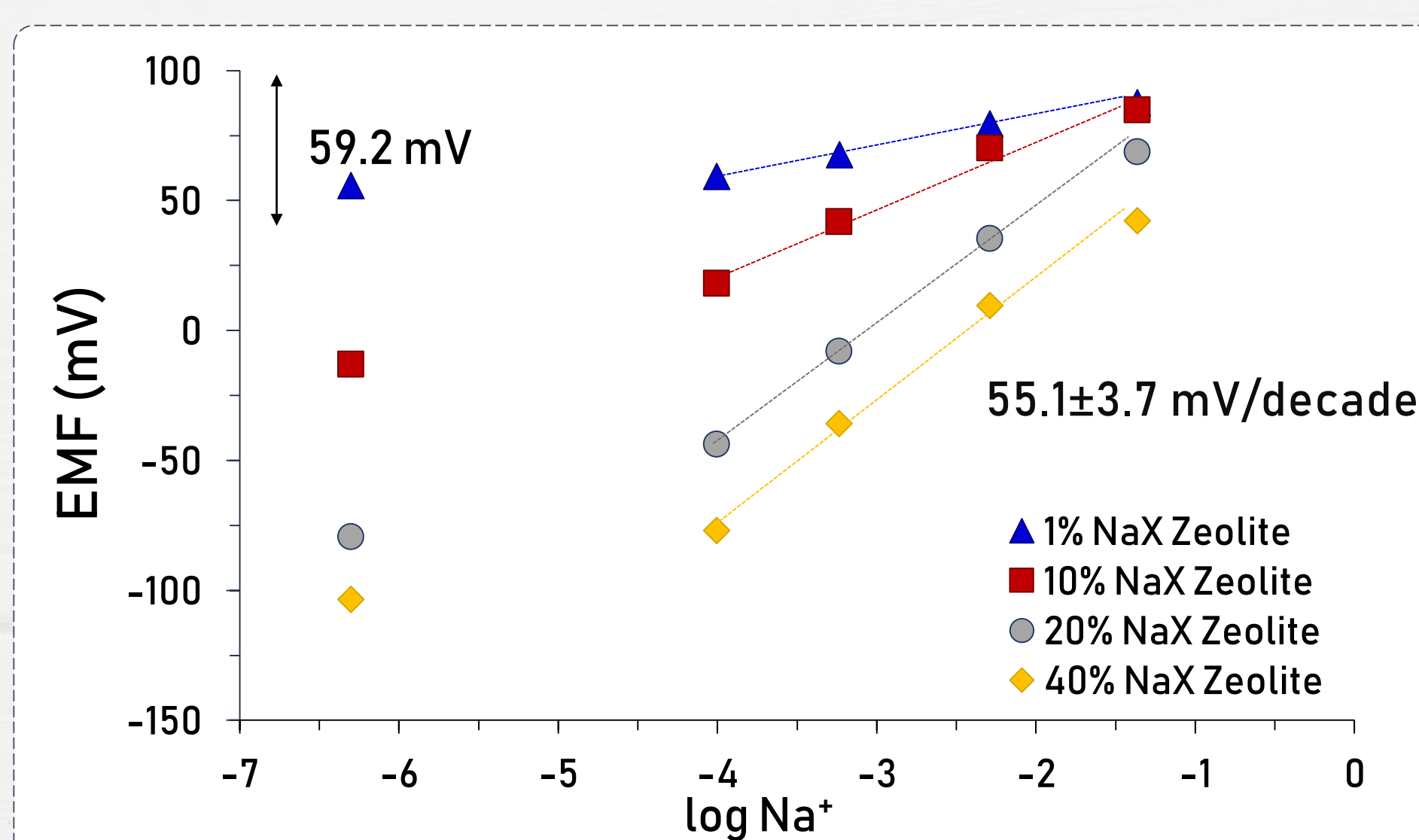
#### ISE and ISP comparison

Category	Classic ISE	ISP
Matrix	Conductive polymer	Graphite
Resistance	10 <sup>6</sup> Ω	10 <sup>3</sup> Ω
Ionophore	Valinomycin	Zeolite
Preparation	Chemical deposition	Drawing

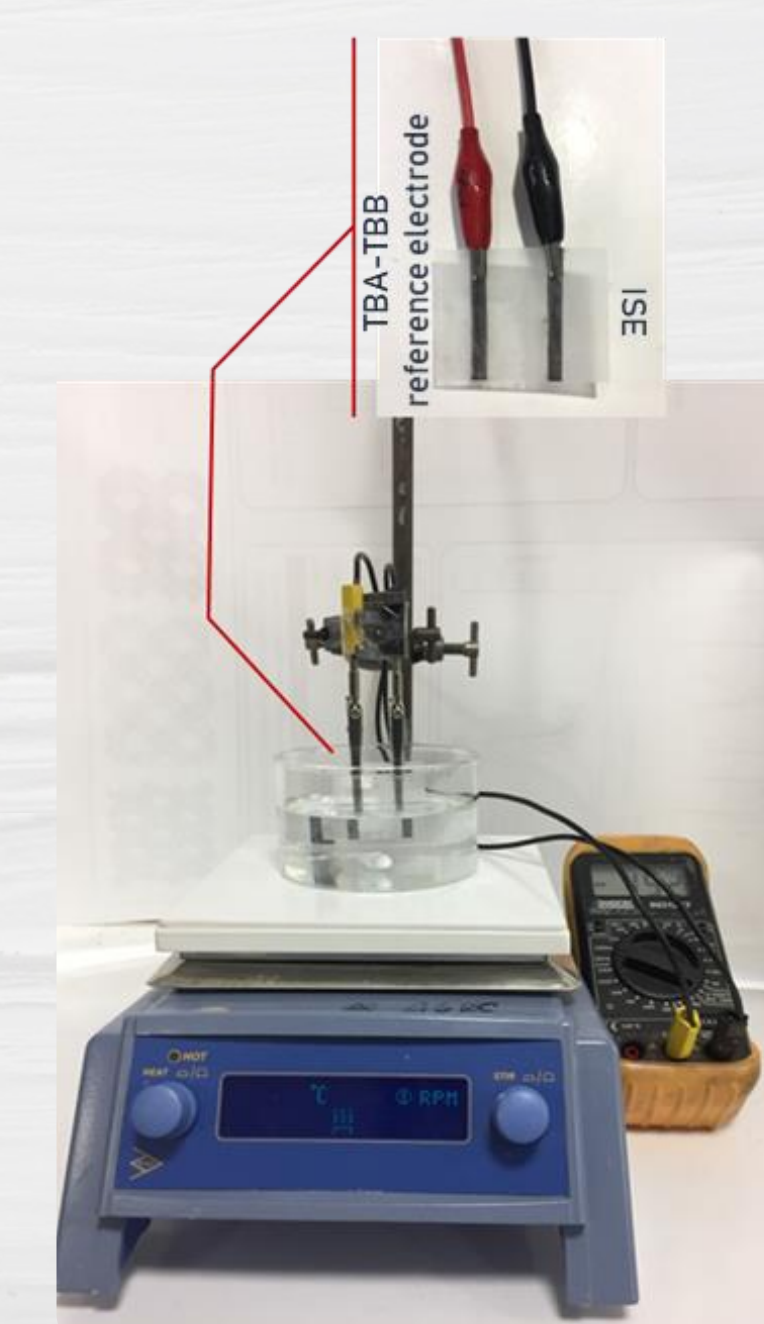
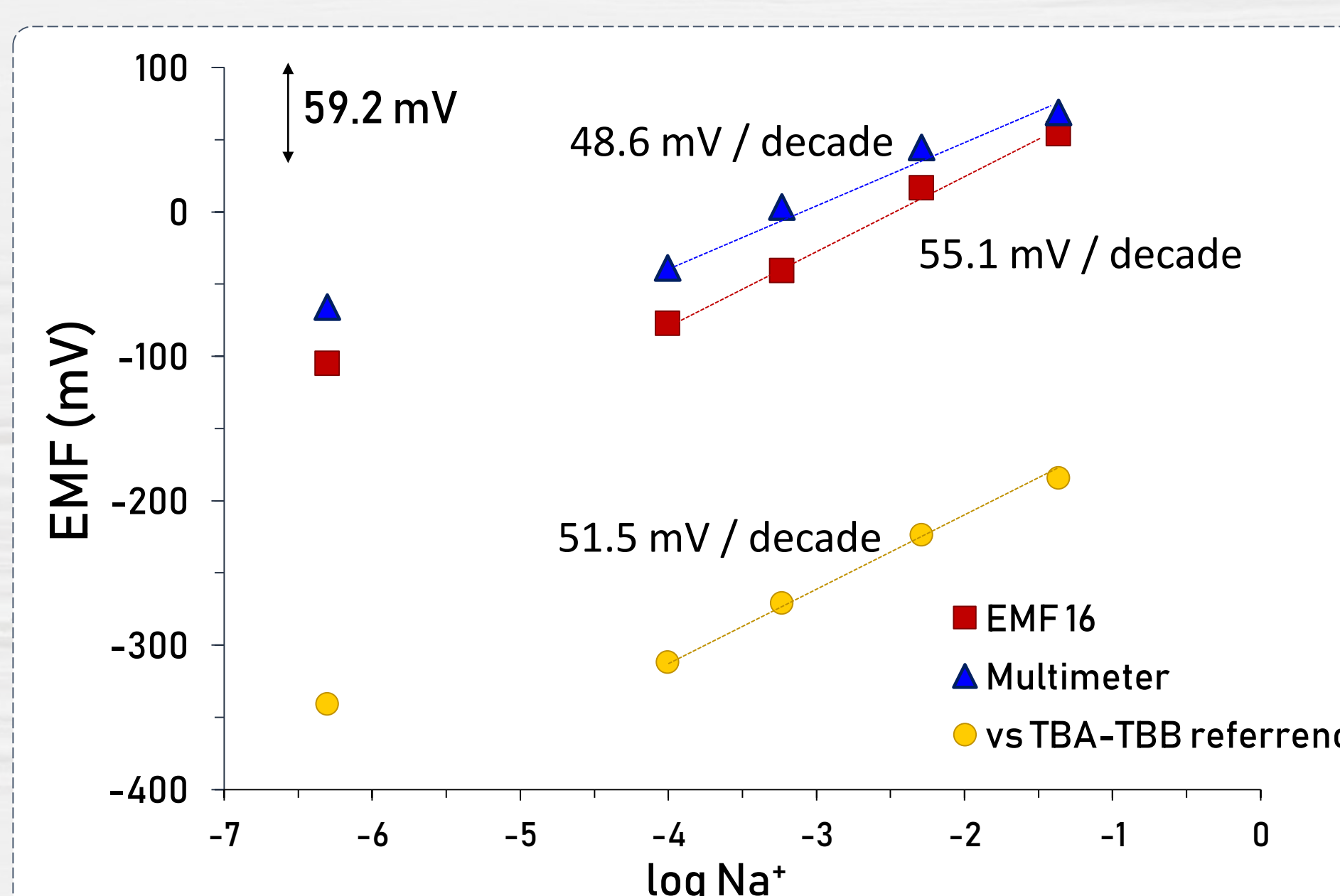


### Results and discussion

#### The potentiometric response of Na<sup>+</sup> - selective ISP sensor

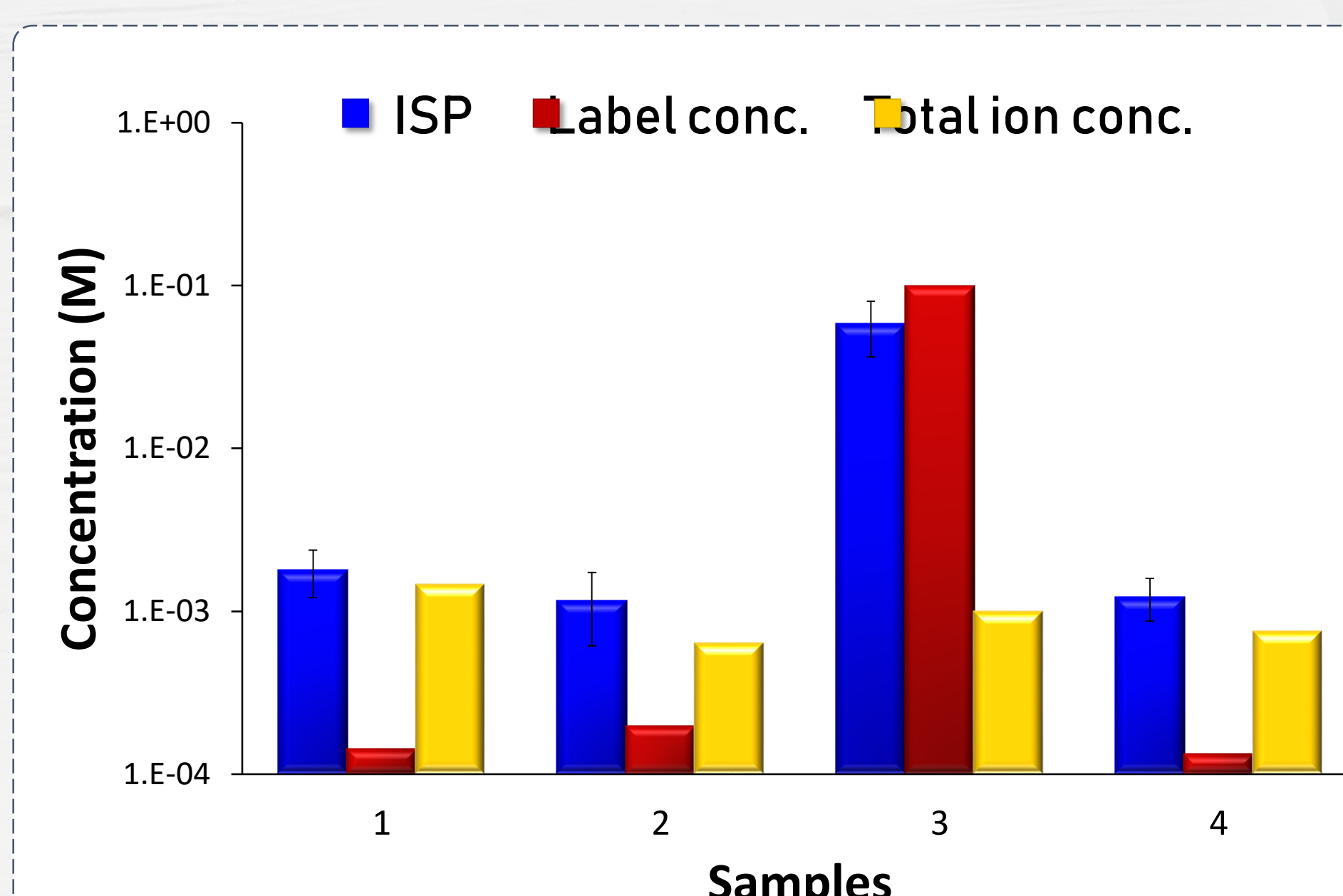


Composition of a pellet optimised at 40wt% of NaX zeolite  
Near-Nernstian response of 55.1±3.7 mV/decade



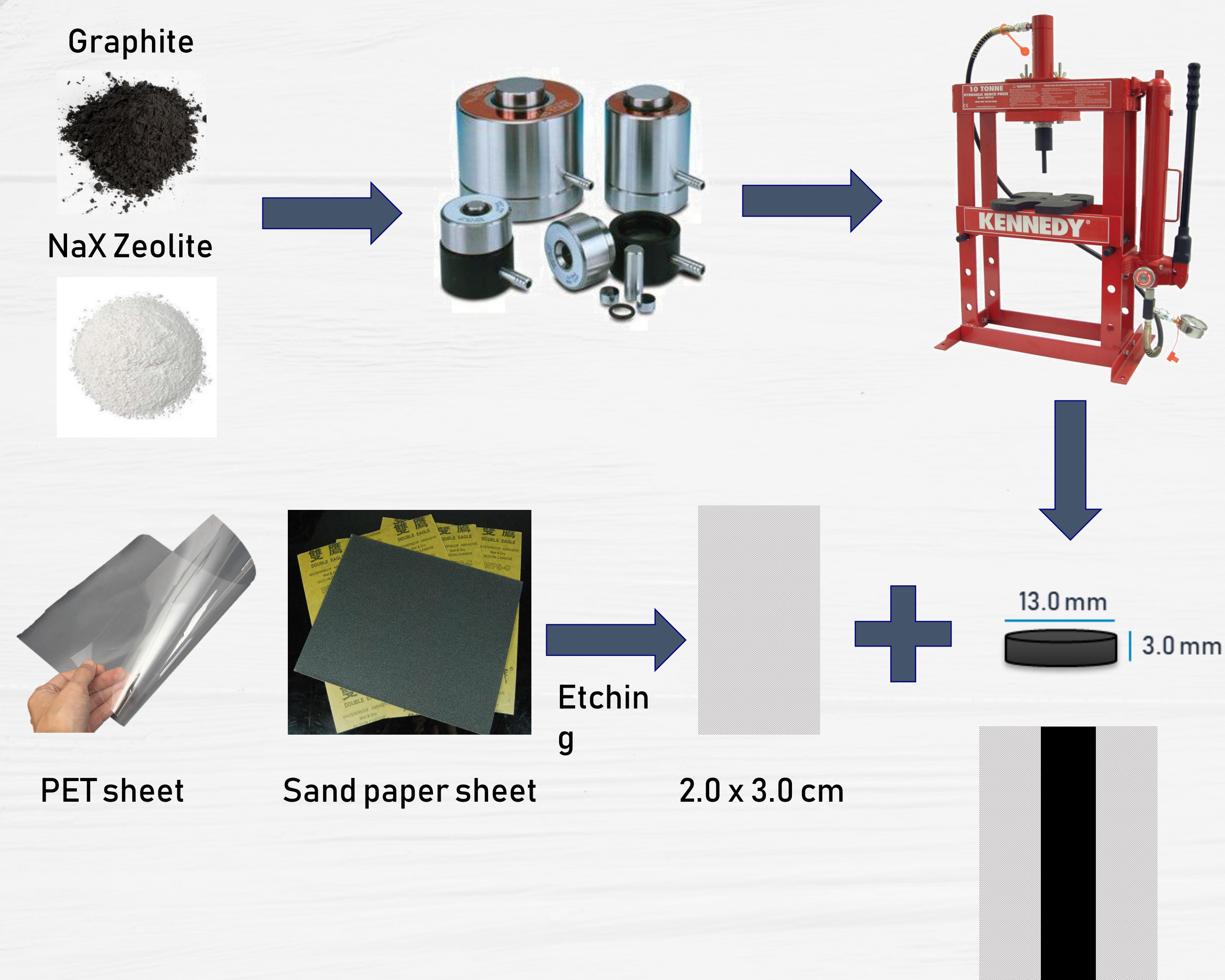
Multimeter measurements provide the near-Nernstian slope  
Solid contact reference electrode can be used instead of a classic one

#### Real-life sample analysis



Real-life samples (bottled water and instant soups) have been tested  
Total amount of ions is detected

### Experimental



### Conclusion

- Simple and inexpensive preparation using household items
- Portable and disposable sensors
- Near-Nernstian response
- Ability to measure real-life samples with very simple handling protocol suitable for citizen science projects

### Selected references

- ❖ T. Fayose, L. Mendecki, S. Ullah, A. Radu, *Anal methods* **2017**, 9, 1213-1220
- ❖ A. Walcarius, *Analytica Chimica Acta* **1999**, 384, 1-16.