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Resource recovery from aerobic granular sludges

Abdo Bou-Sarkis, Etienne Paul, Yolaine Bessière, Nicolas Derlon, Elisabeth Girbal-Neuhauser

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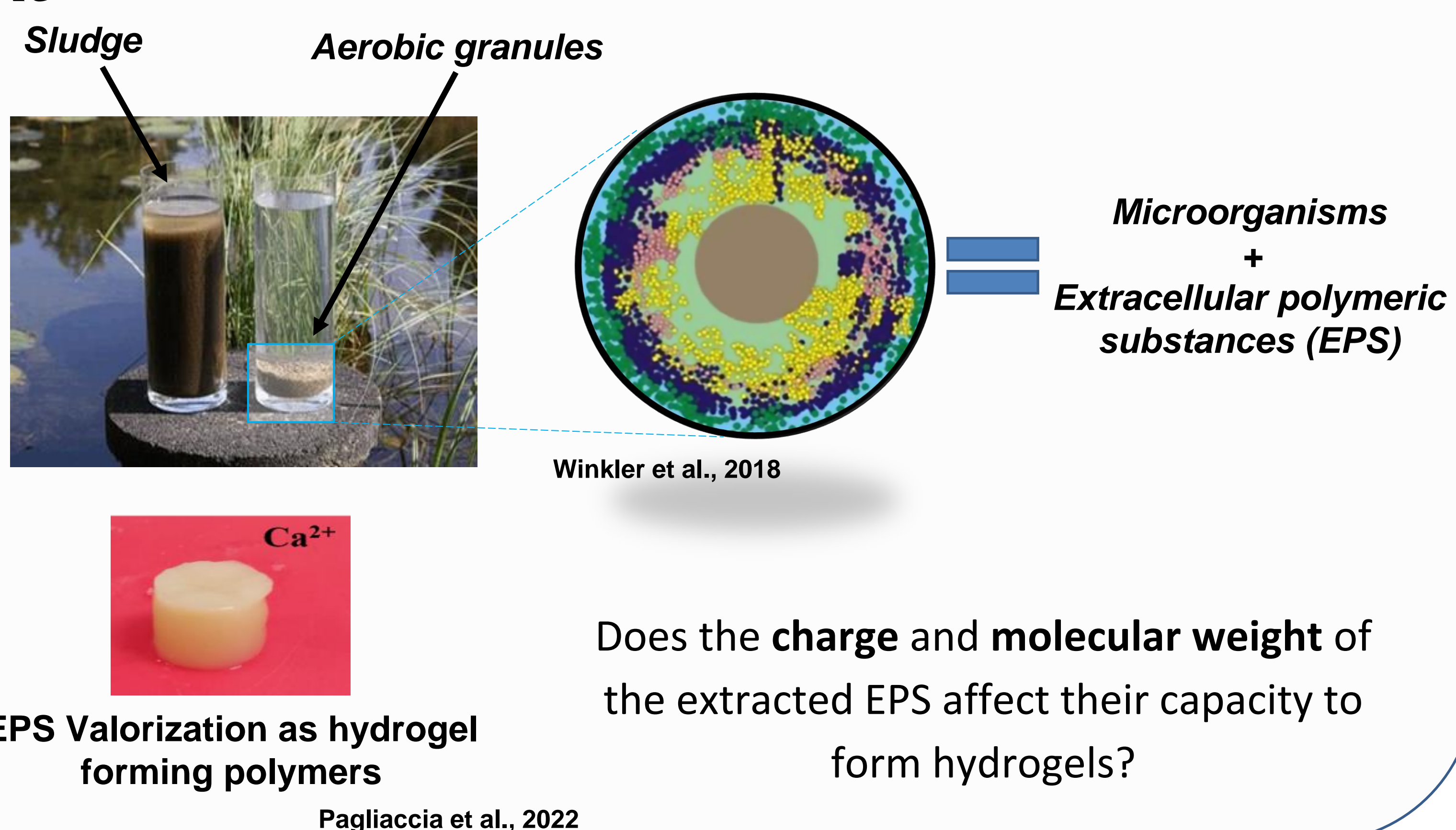
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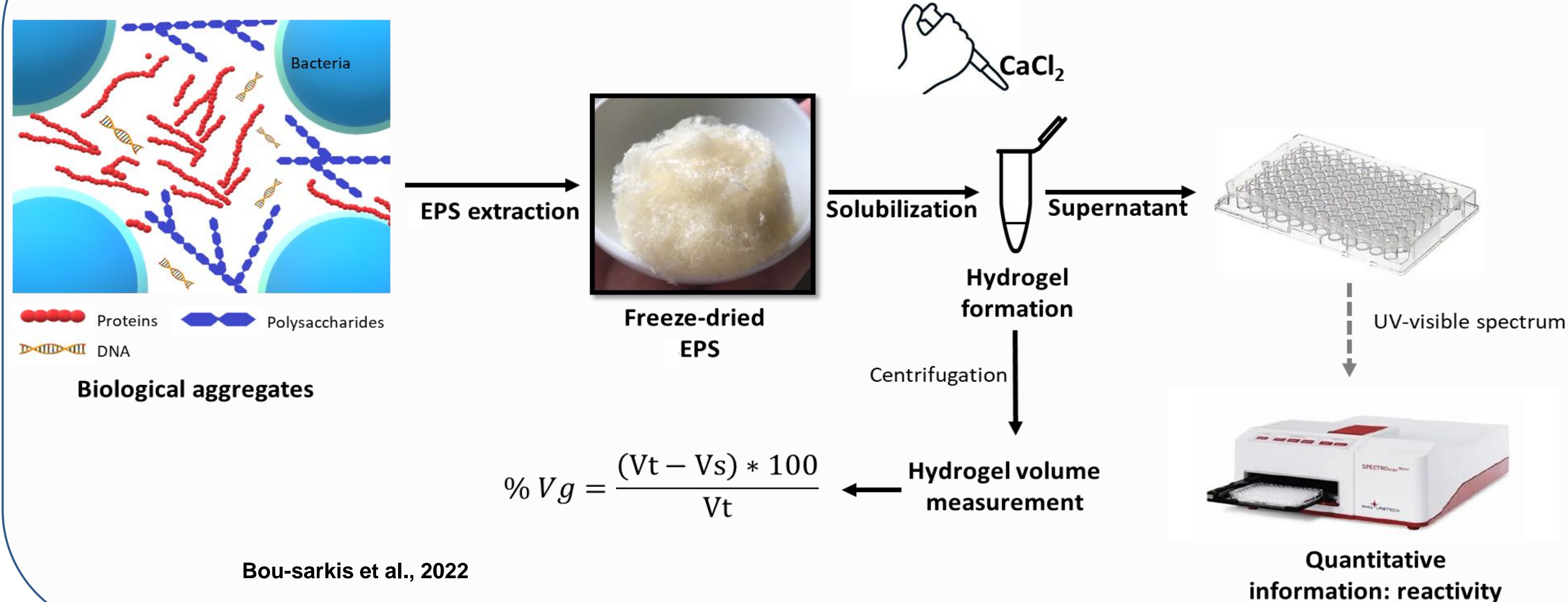
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Context

- Extracellular polymeric substances (EPS) extracted from aerobic granular sludge have the capacity to form hydrogels in the presence of divalent cations like calcium (Bou-sarkis et al., 2022).
- The characteristics of the obtained hydrogels are influenced by their molecular properties:
 - In the case of alginates from seaweed, a higher molecular weight was shown to give the compound a better gel formation kinetics and enhanced viscosities (Farrés & Norton, 2014).
 - the charge of molecules influences their gelling capacity (Beaumont et al., 2021).
- Lack of knowledge concerning the effects of molecular weight and net surface charge on EPS gelation.

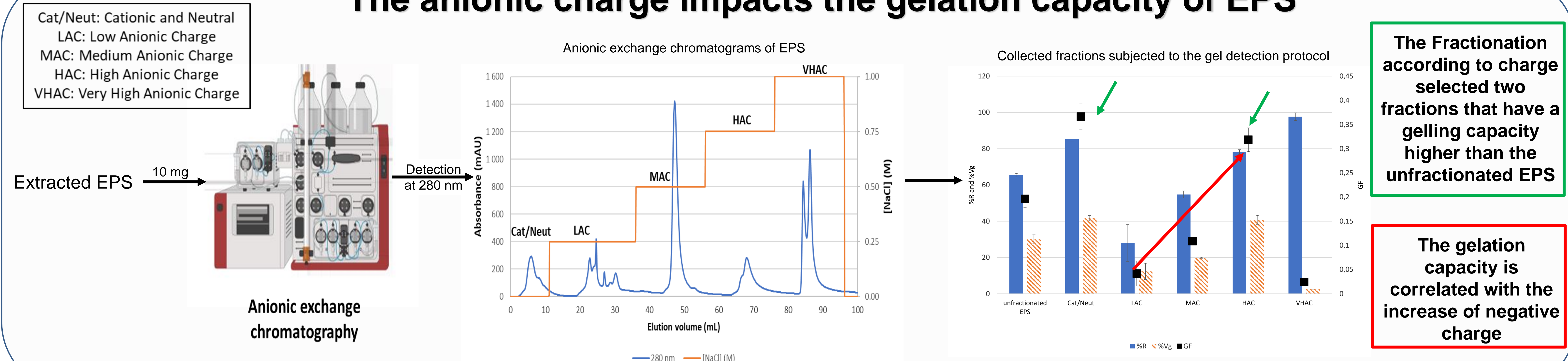


Detection of gelation through a miniaturized screening method

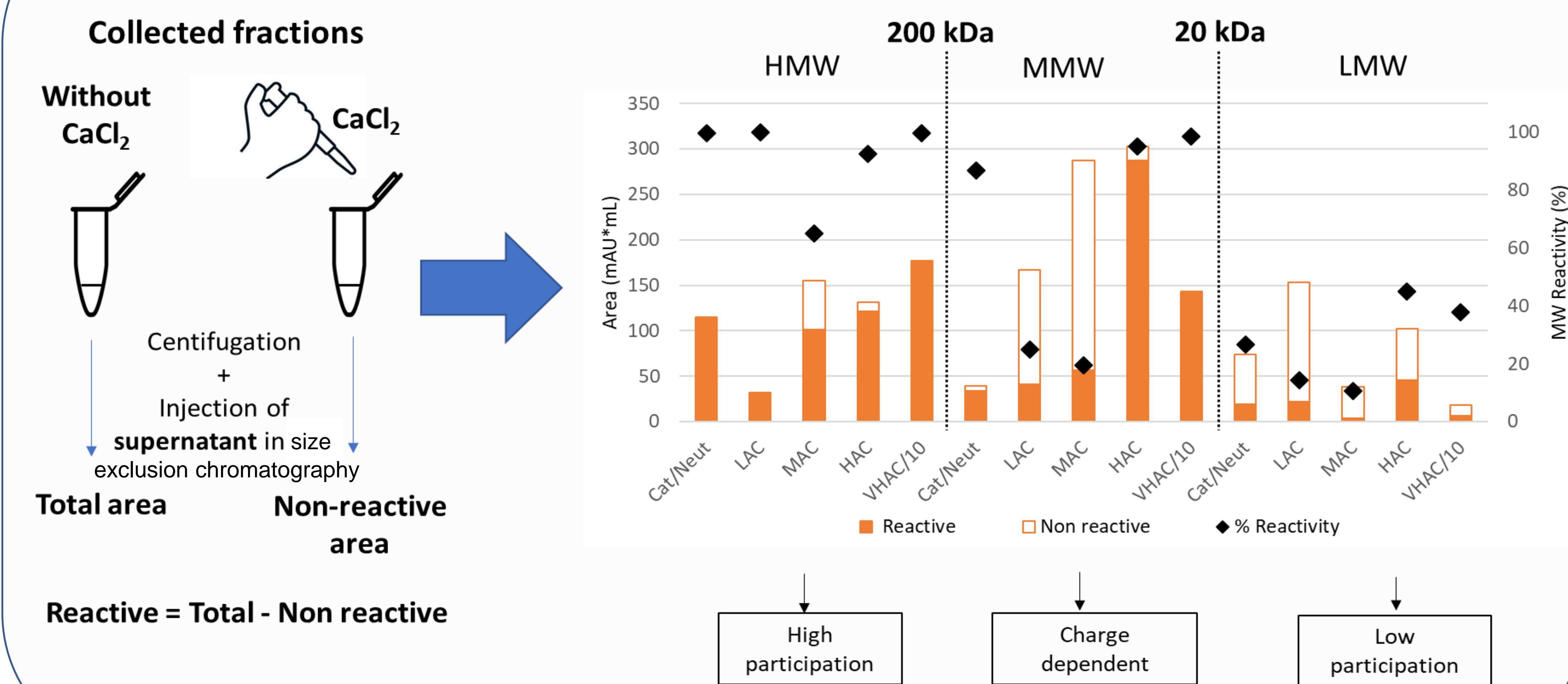


- Extracted EPS at a final concentration of 1 % (w/v) VS were incubated for 1h with 0.1 M calcium chloride (**using only 2 mg of the sample to be tested**).
- Centrifugation at 14 000g for 15 min.
- The volume of the supernatant was measured and therefore the gel volume (Vg) giving a gel volume percentage (% Vg).
- UV-vis spectra between 220 and 500 nm were measured to determine a reactivity (%R) corresponding to the percentage of area that disappeared from the spectra after addition of calcium.
- The gelling factor (GF) equation is: $GF = \% Vg * \% R$

The anionic charge impacts the gelation capacity of EPS



Molecular weight affecting the reactivity of EPS to calcium



Conclusions

- A miniaturized screening method capable of detecting gelation was developed.
- The gelation capacity of EPS is correlated with its negative charge.
- Preserving high molecular weight polymers of gel-forming polymers is crucial for the valorization of EPS as gelling agents.