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PRECIPITATION STRIPPING OF NANOMETRICAL PARTICLES FOR THE RECOVERY OF VANADIUM

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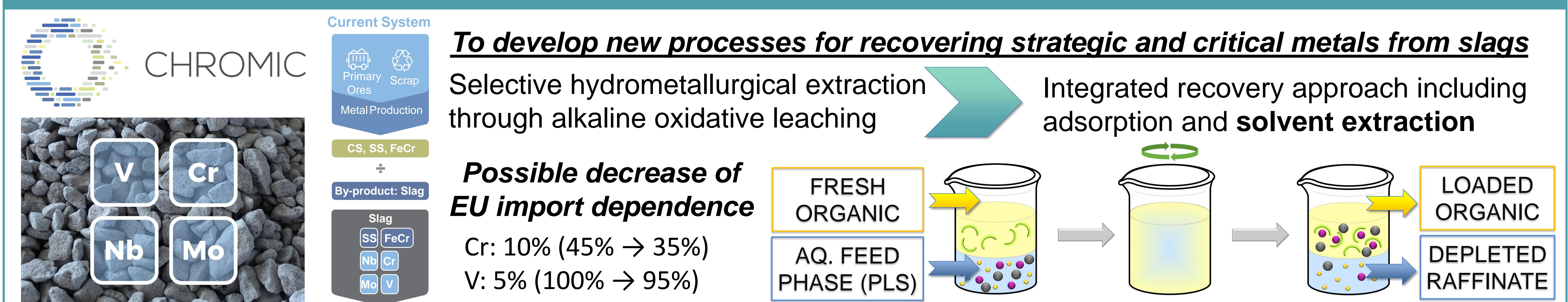
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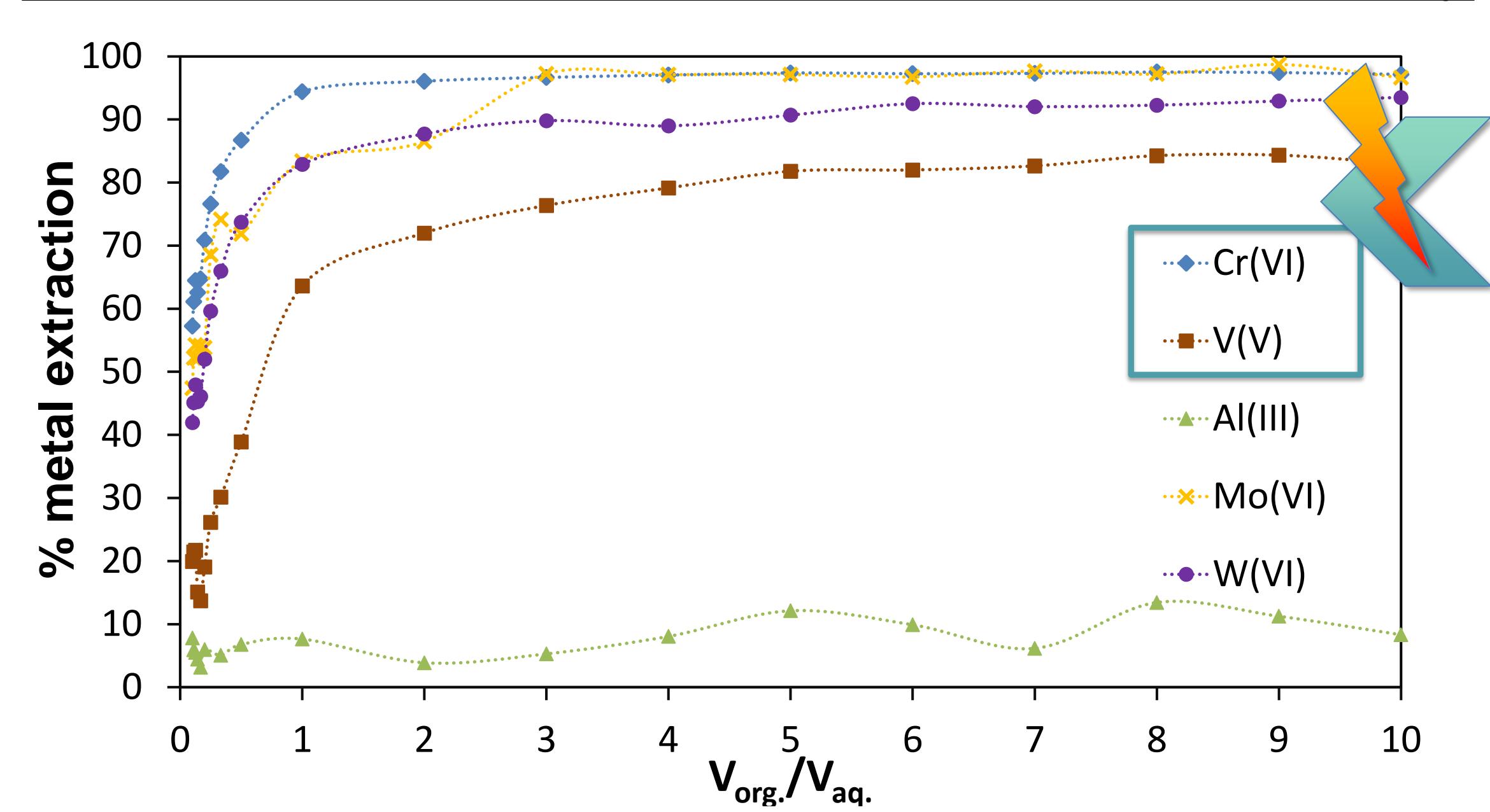
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MOTIVATION

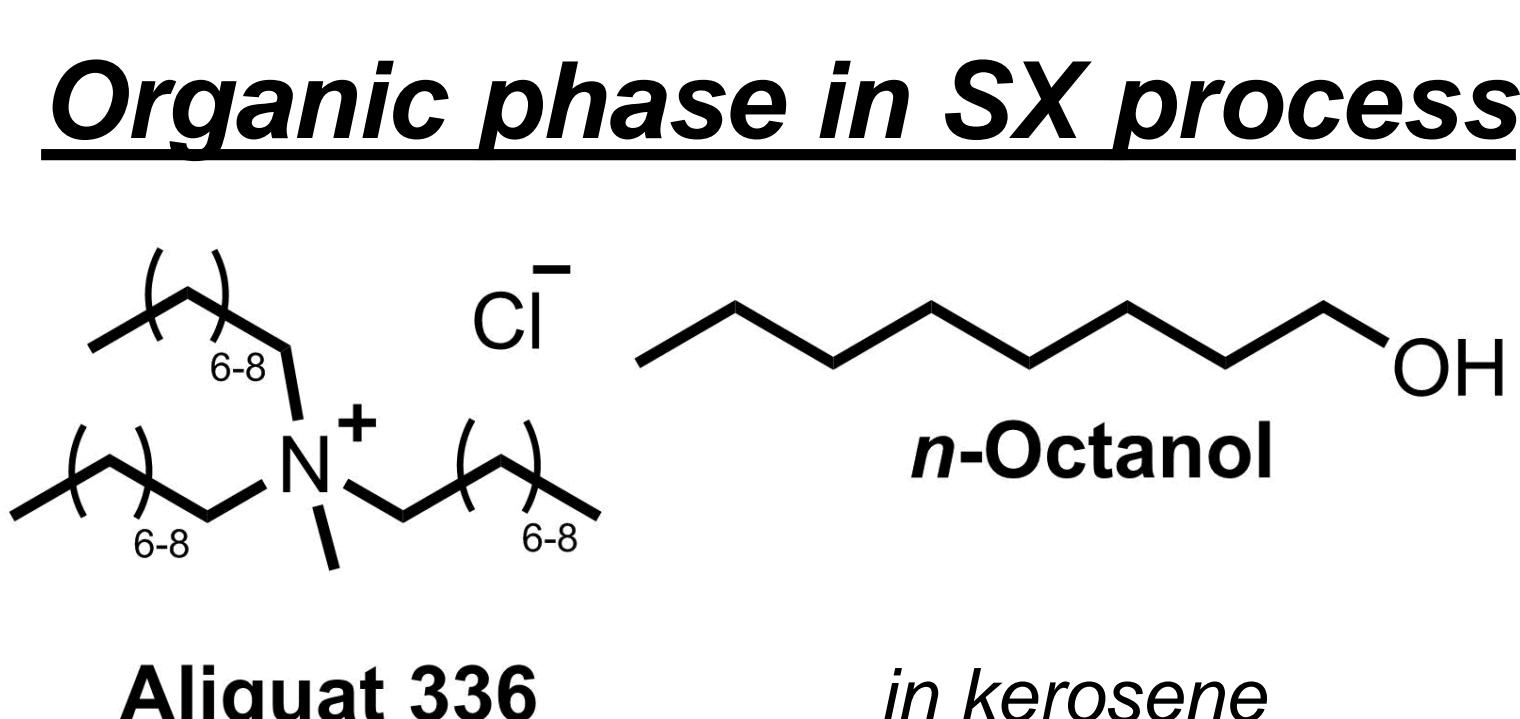


SYNTHESIS of METAL VANADATES by SOLVENT EXTRACTION

Conventional SX process with low selectivity Composition of real leachates

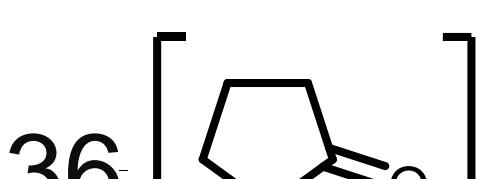


alkaline oxidative leaching
1-3 g/L Cr(VI), 1-10 mg/L V(V),
0.1-2 g/L Al, Ca, Si, W, Mo, Mn,
pH 12-14



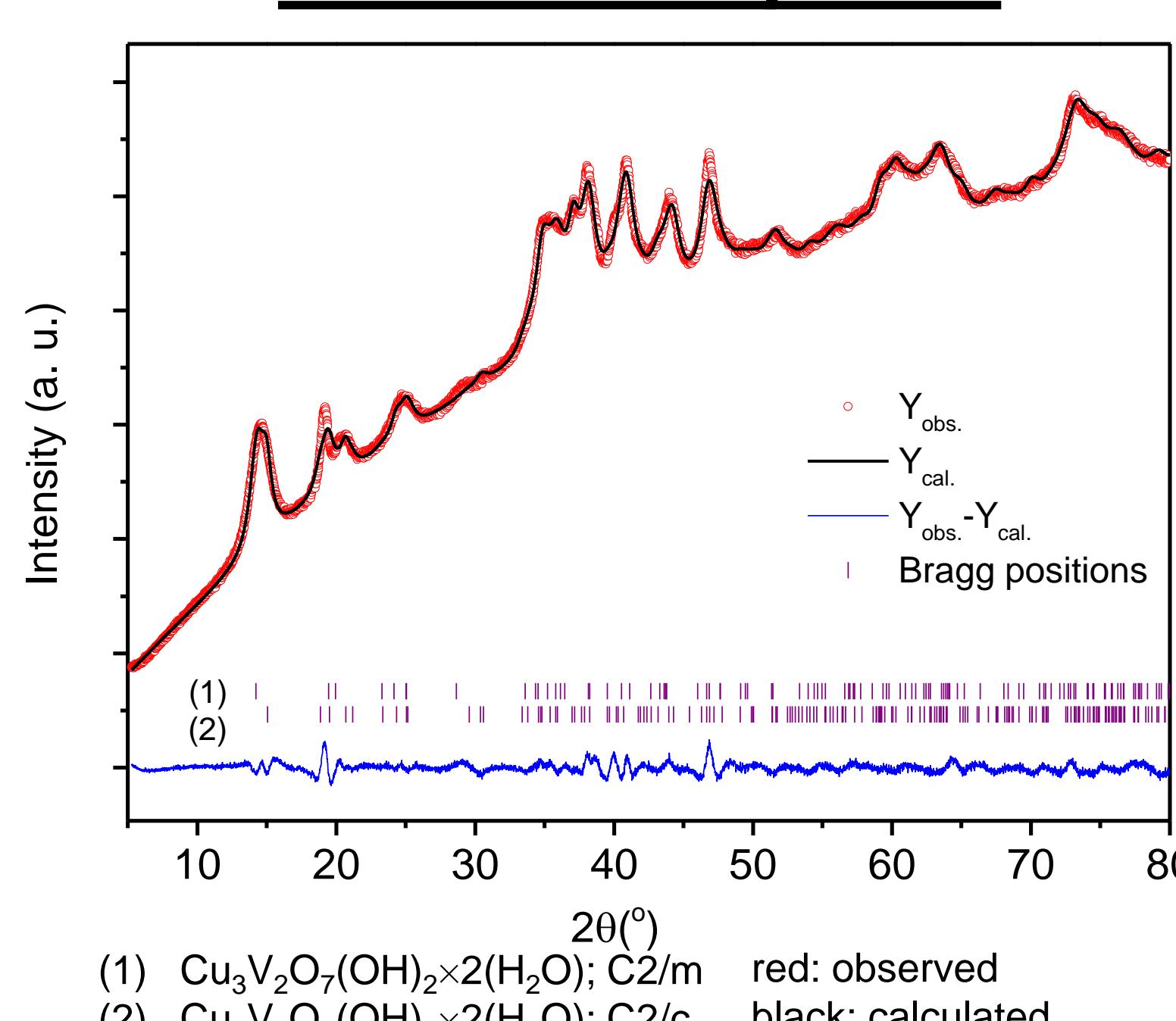
Exp.	Method	Cu(II)	PVP	NaCl
S1	Precipitation stripping	0.05 M	-	4 M
S2	Precipitation stripping	0.1 M	-	4 M
S3	Precipitation stripping	0.05 M	20 g/L	4 M
P1	Conv. precipitation	0.05 M	20 g/L	4 M

Synthesis of materials

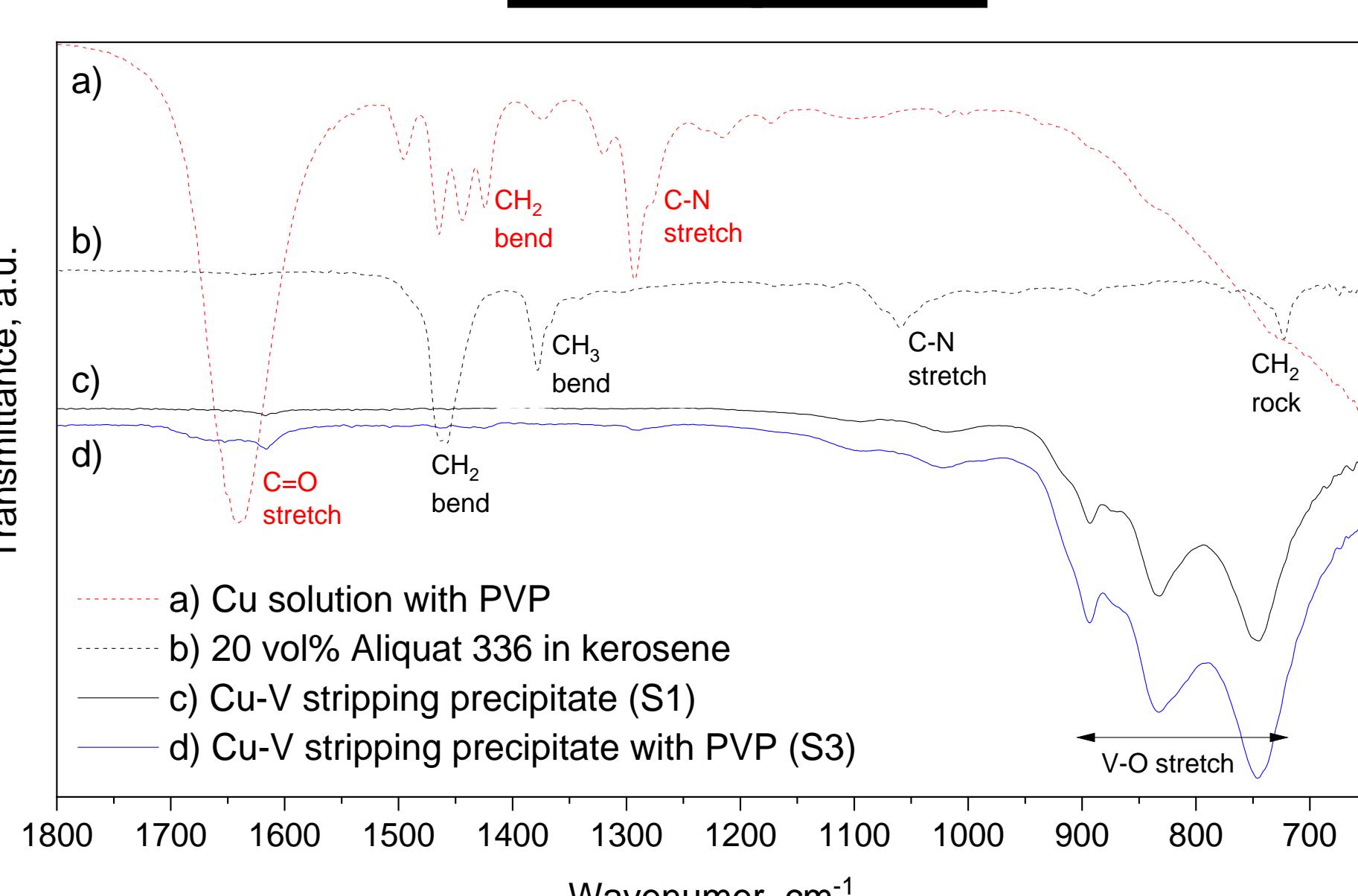
- 1) V(V) separation by sorption or model solution
 - 2) Extraction with AQ336
 - 3) Stripping with NaCl + Cu(II) salt + PVP

The diagram shows the chemical structure of the repeating unit of Polyvinylpyrrolidone (PVP). It consists of a pyrrolidone ring linked via its nitrogen atom to a methylene group, which is further linked to a vinyl group (CH_2CH_3). The polymer chain extends from the vinyl group. The structure is enclosed in brackets with a subscript 'n' at the bottom right.

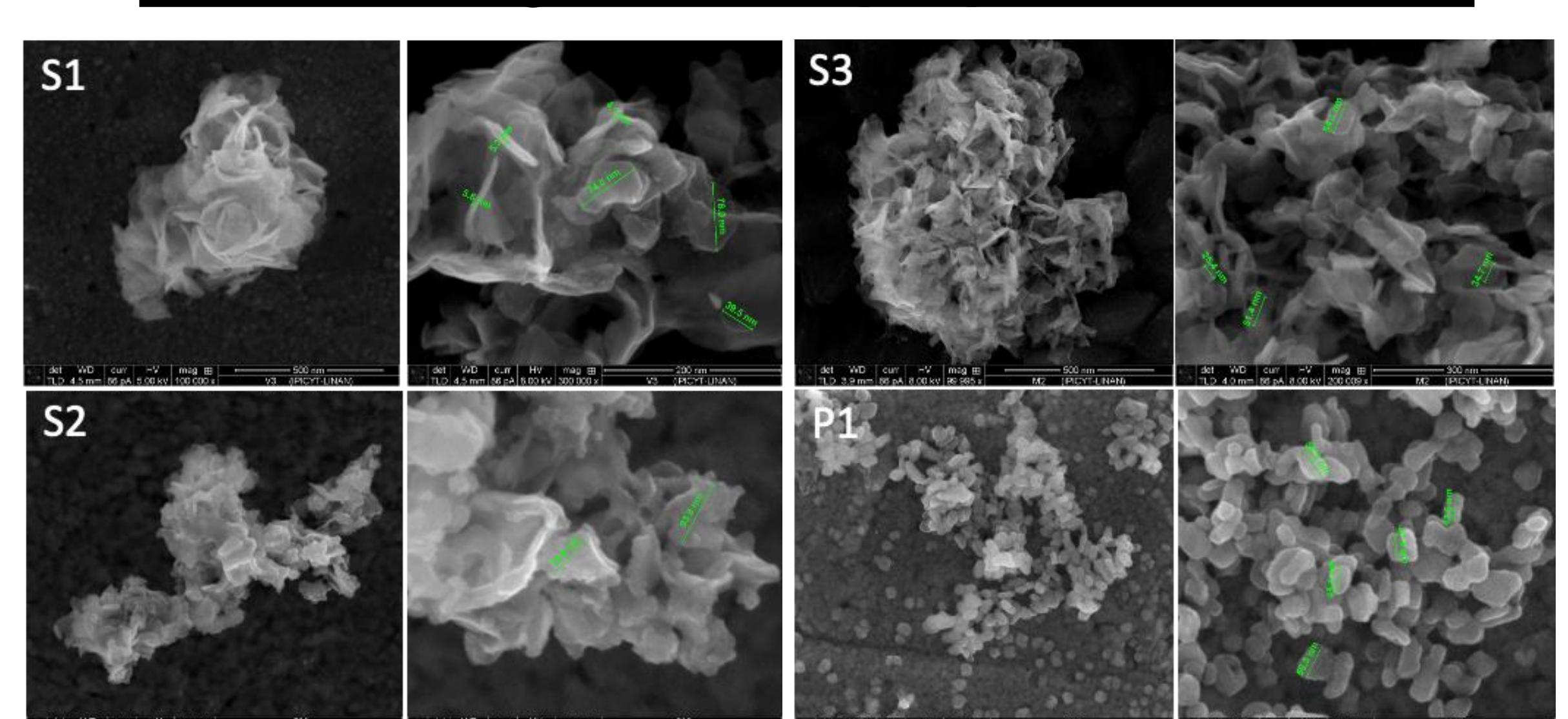
XRD for sample S2



FTIR spectra



low amount of PVP on particle surface



PVP acting as nucleation and crystal-growth assistant for P1 and to a lesser extent for S3

OUTLOOK

- ❖ precipitation stripping is a promising alternative to the conventional precipitation process for preparation of nanomaterials
 - ❖ further optimization of the preparation route (e.g. concentration, additive, organic phase, metal salt) for the control of particle characteristics (size, morphology) → catalytic properties, sensors, electrodes
 - ❖ integration in continuous SX processes and scale-up