High-capacity zinc vanadium oxides with long-term cyclability enabled by in-situ electrochemical oxidation for zinc-ion batteries

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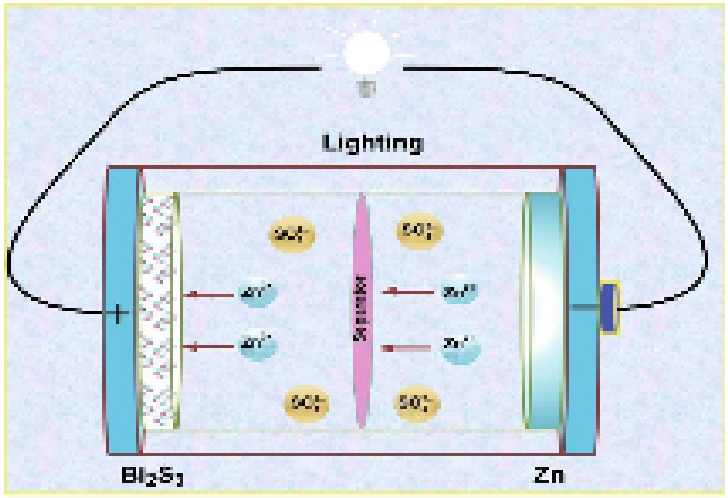
Introduction

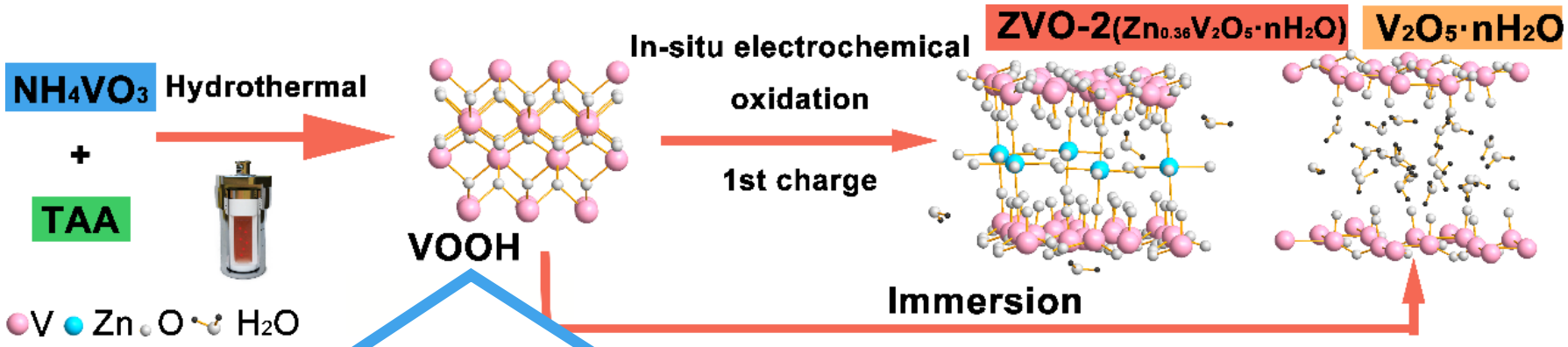
The rechargeable aqueous zinc ion batteries hold great promise but are extremely limited by the lack of suitable cathodes.

The structural instability and poor conductivity of vanadide need to be solved.

The introduction of metal ions at interlayers of host materials is an effective modification strategy.



Experiment and Materials



Structural information on the different phases of VOH.

Sample	Space group	Crystal system	Cell parameter
VOH-1	Amam (63)	Orthorhombic	a=3.87, b=12.4, c=3.06 and α=β=γ=90°
VOH-2	P21nm (31)		a=4.862, b=4.443, c=2.956 and α=β=γ=90°
VOH-3	Pbnm (62)		a=4.6048, b=9.9595, c=3.023 and α=β=γ=90°

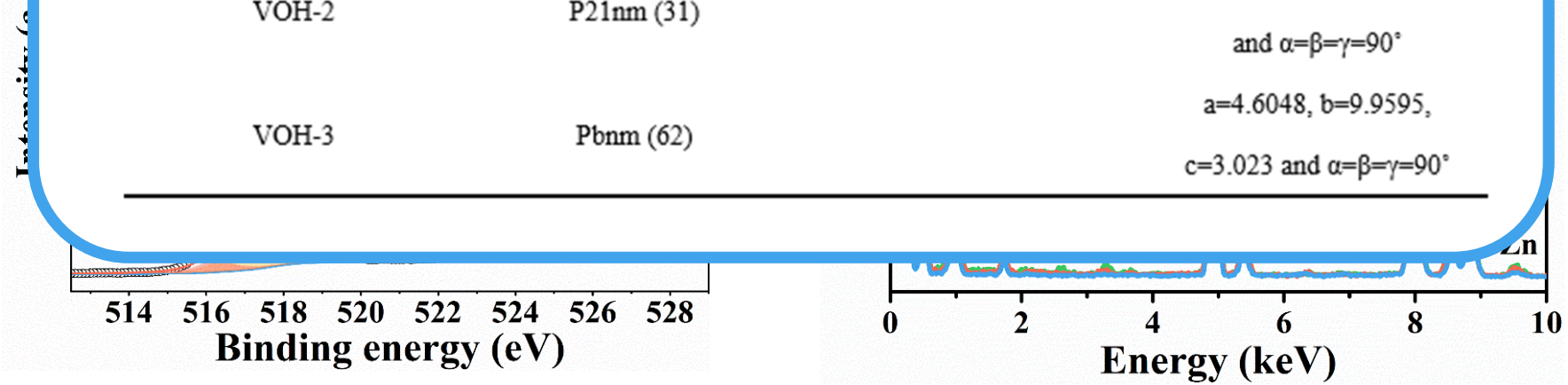


Fig. 1. V 2p spectra of ZVO and $V_2O_5 \cdot nH_2O$ (a) and EDS spectra of ZVO (b).

Experiment and Materials

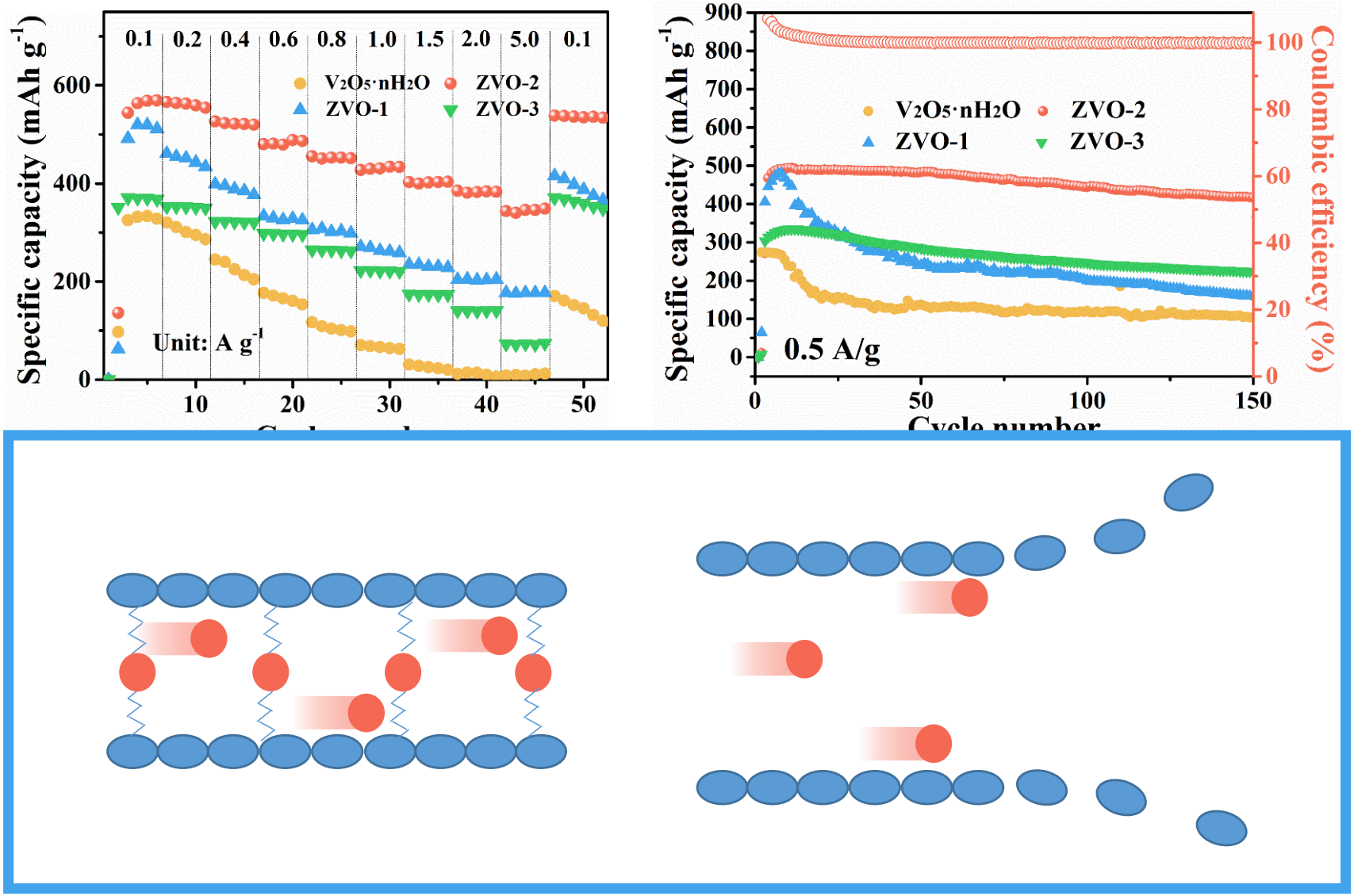


Fig. 2. Electrochemical properties of ZVO and $V_2O_5 \cdot nH_2O$. (a) Rate performance, (b) cyclability at 0.5 A g^{-1} and (c) cyclability at 5 A g^{-1} of ZVO and $V_2O_5 \cdot nH_2O$.

Electrochemical properties

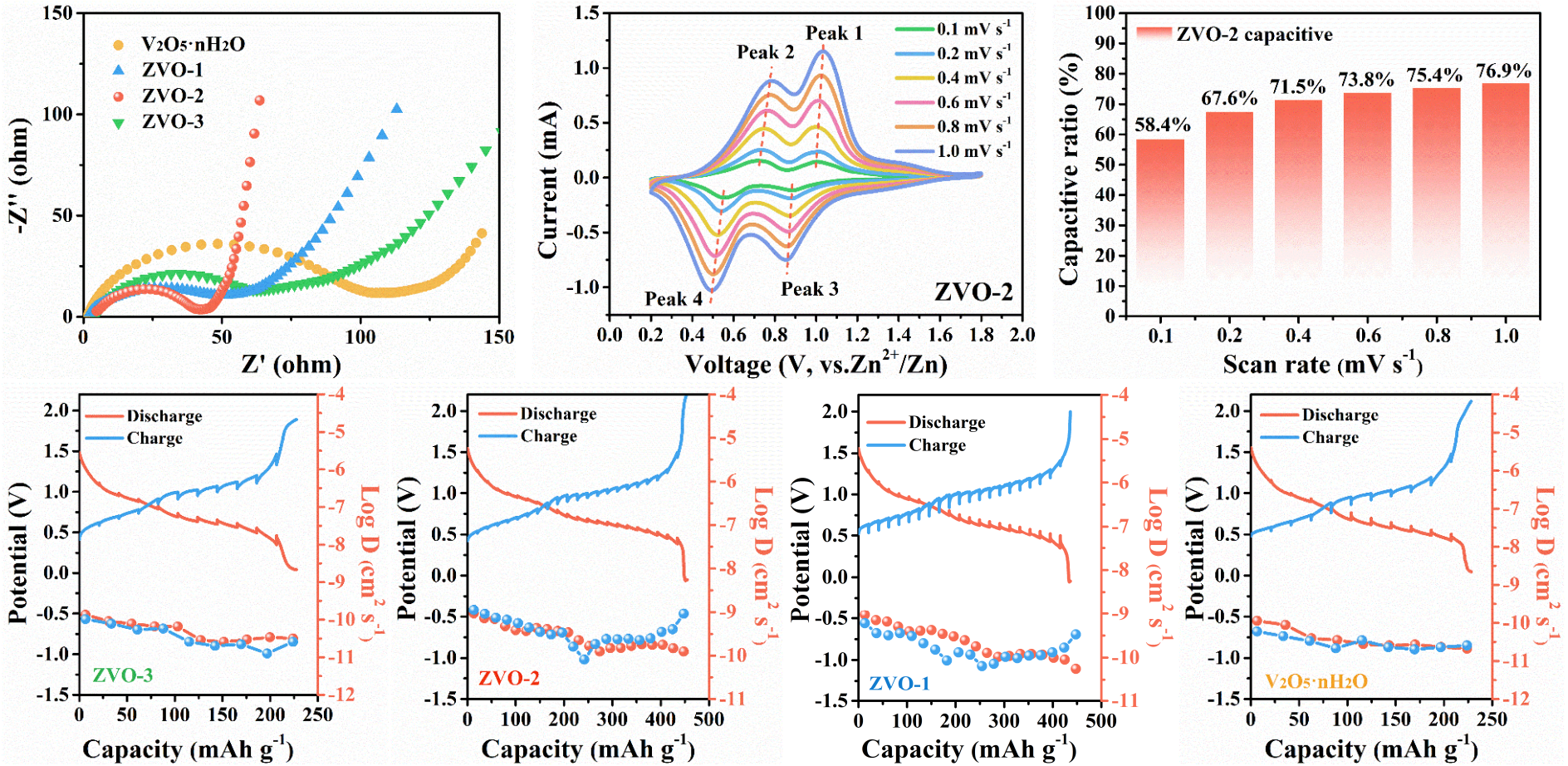


Fig. 3. EIS patterns of all samples (a), CV profiles of ZVO-2 at different scan rates (b), the contribution ratio of capacitive capacities in ZVO-2 (c), GITT profiles and diffusion coefficients of all samples (d).

Thank you!

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