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Opportunities and Challenges of Organic RFBs

Mining redox active organic molecules

- **Low cost and sustainable (C, H, O, N)**
- **High performance (synthetic tunability)**
- **Mechanistic understandings**
- **Coupled with inorganics**

	Energy	Power	Membrane	Safety	Stability
AORFB	< 84 Wh/L (1.25 V, 4 M)	High (> 100 mW/cm^2)	Selective and porous	High	Good
NAORFB	> 100 Wh/L (3 V, 2.5 M)	Low (< 30 mW/cm^2)	Porous only (crossover)	Low (organic solvents)	Poor (radicals)
		Maybe ok for hours storage	Size exclusion? new IEM?	Reduce organic solvent; additives	Lower voltage? molecular design?

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Evaluation of RFBs

Electrolyte materials:

- **Full spectroscopic and E-chem characterization**
- **Single electrolyte half-cell RFB tests**
- **Post-cell analysis**

Nano Energy **2017,** *42*, 215-221.
Joule **2019,** *3*, 1-15.

Full RFBs

- **Rate performance (> 10 mA/cm^2)**
- **Energy efficiency > 80%**
- **Power density**
- **Energy density (> 0.5 M)**
- **Capacity retention (vs cycles number and time)**
- **Operando and post-cell analysis**
- **Standard flow cell??**