Simulation for Flow field effect on Vanadium redox battery and performance optimization

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Vanadium Redox Battery(VRB) produce electricity by redox reaction of vanadium ions. It is stable and easily expandable energy storage device.
Like many other electrochemical device, VRB use porous carbon electrodes to increase active surface area. Flow channel is an empty space structure in the cell. It helps electrolytes flow and mass transportation.
General flow channel design locates channel at current collector. In this study interdigitated channel structure is placed in the porous electrode. Inside channel structure showed advanced cell efficiency. It reduce pressure drop of cell and increase total current ratio in scale up. Channel cross sectional form also affect cell performance. Optimize cell structure with COMSOL simultion