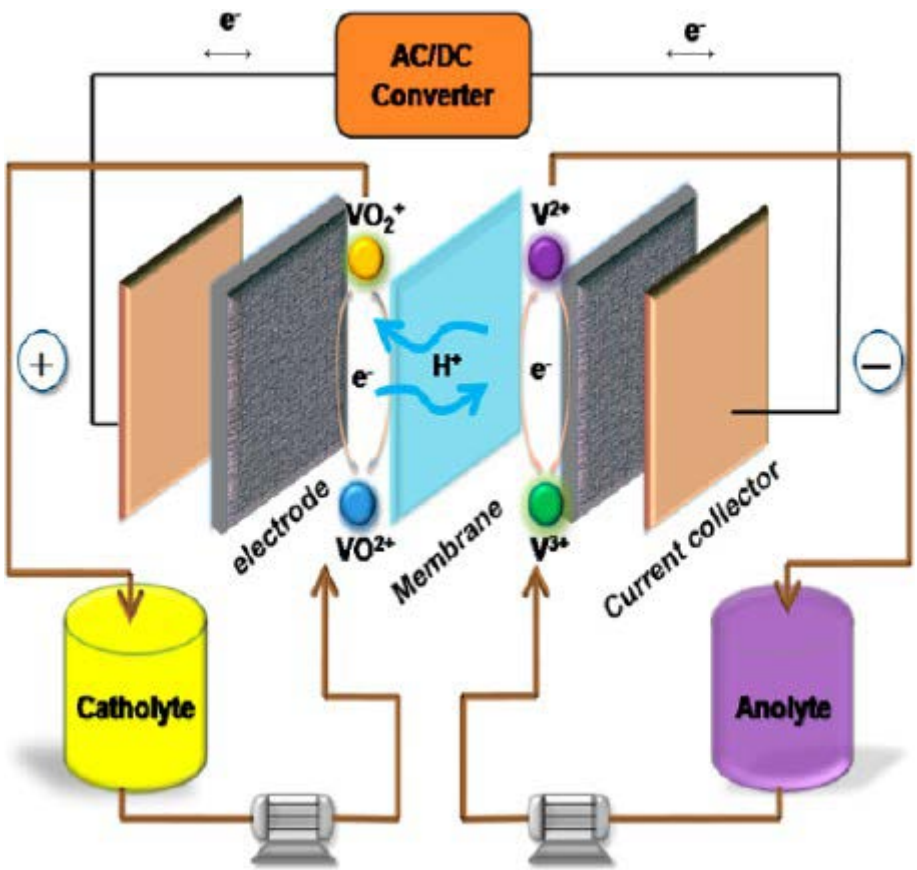
Flow Batteries

-Vanadium Redox Flow batteries are based on storing energy by separating charges.

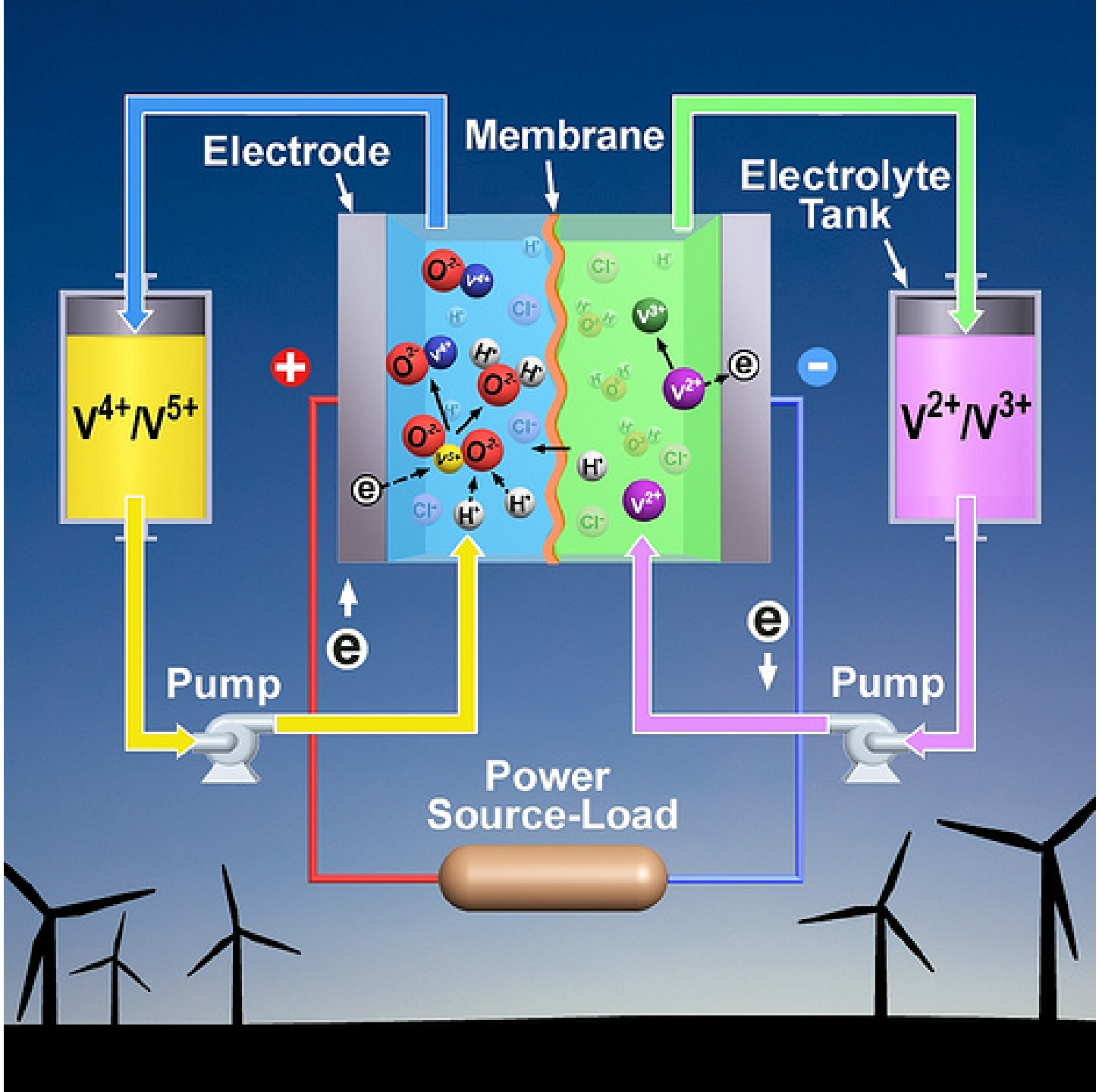
-Vanadium is easily dissolved in Water to form aqueous solutions

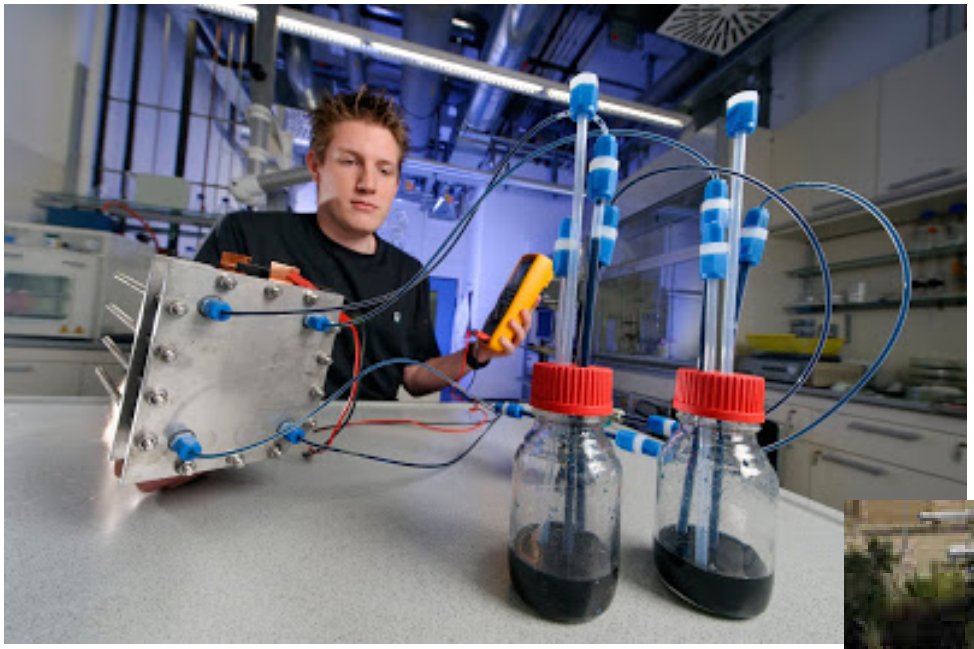
-Flow batteries are operate at Room temperature.



Vanadium exists in four different oxidation States or charges: V^{+2}, V^{+3}, V^{+4}, and V^{+5}

From left: $[V(H_2O)_6]^{+2}$ (lilac), $[V(H_2O)_6]^{+3}$ (green), $[VO(H_2O)_5]^{+2}$ (blue) and $[VO(H_2O)_5]^{+3}$ (yellow).


Electrode
Membrane
Electrolyte Tank
V^{4+}/V^{5+}
V^{2+}/V^{3+}
Pump
Pump
Power Source-Load



Small to Large scale

(various internet images)

Flow Cell Battery at Las Positas College: a state of the art project

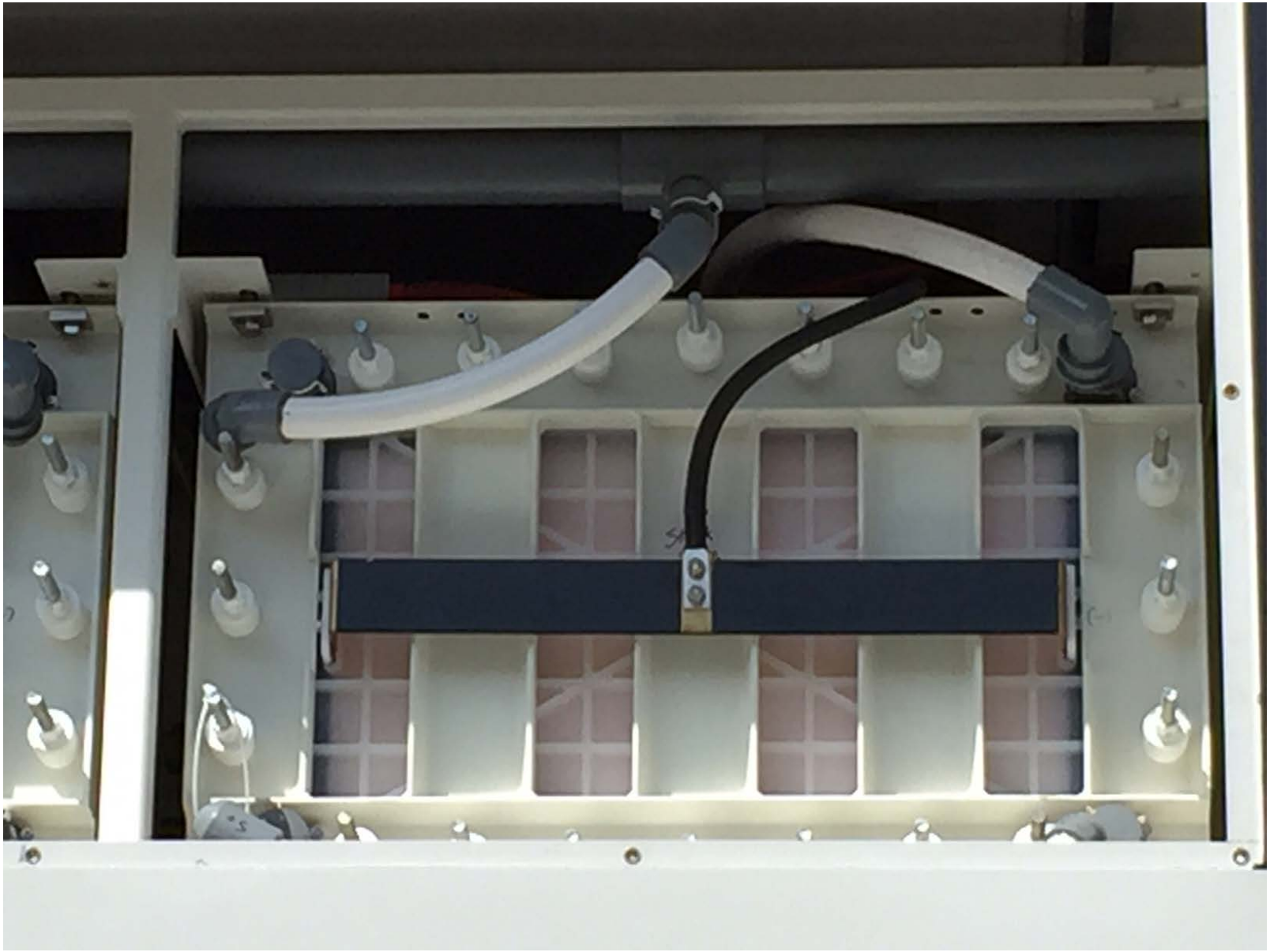
2014- Doug Horner (CLPCCD) and Bruce Rich (PB) applied for a $1.5 M grant
From the California Energy Commission to fund a Flow Cell Battery on behalf of LPC

-$1.5 Million in grant money
-$350K from Measure B Facilities Bond Money
-$100K from a manufacturer rebate
No operational funds were used.

Jan 2015 – Preliminary Approval of Award – only 3 of 20 projects in this category were funded and we were the only community college.
March 2015- Tour of Imergy factory in Fremont, CA. (Made in California)
To Board of Trustees March 17th meeting.
April 2015 – California Energy Commission votes to give final grant approval
May 2015 – Design begins!?

-5 battery units of 50kWH each (250kW rated energy capacity)
-will run 5 hours to give more than 1MWh of power

Flow Cell Battery leaving the factory in Fremont, CA
Photo courtesy of Bruce Rich, Factory Tour, 2015



Close-up of flow cell battery
Courtesy of Bruce Rich, Factory Tour, 2015