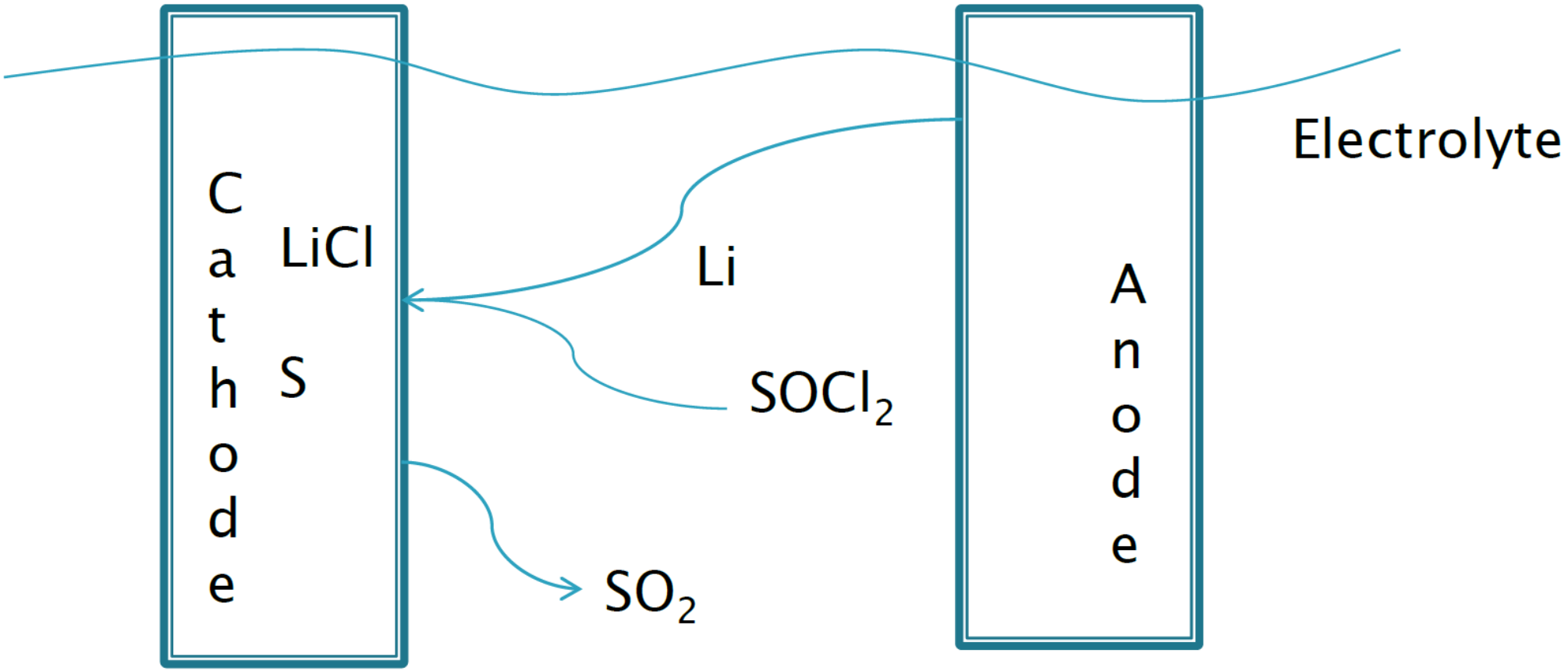
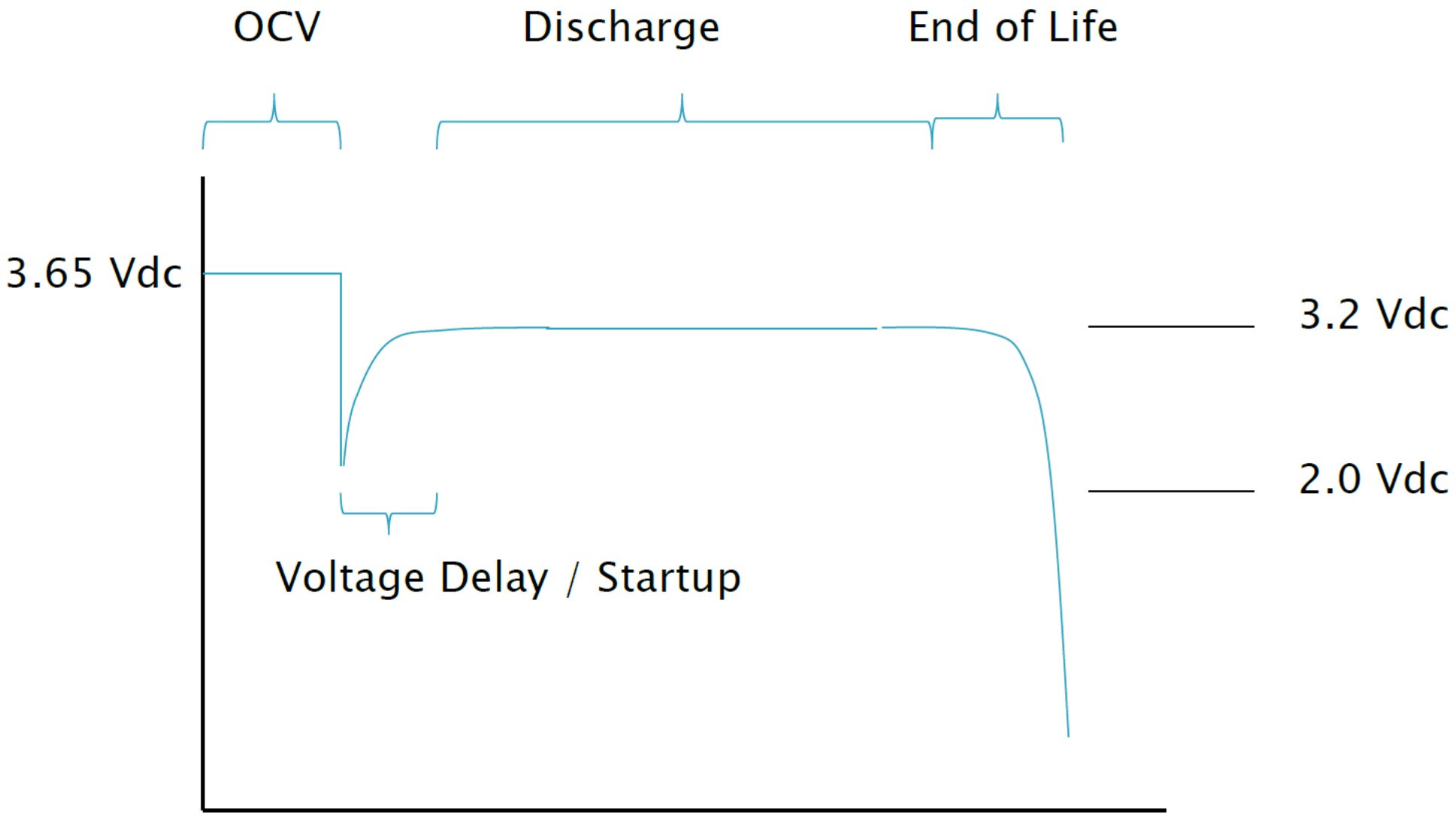
# Discharge Schematic

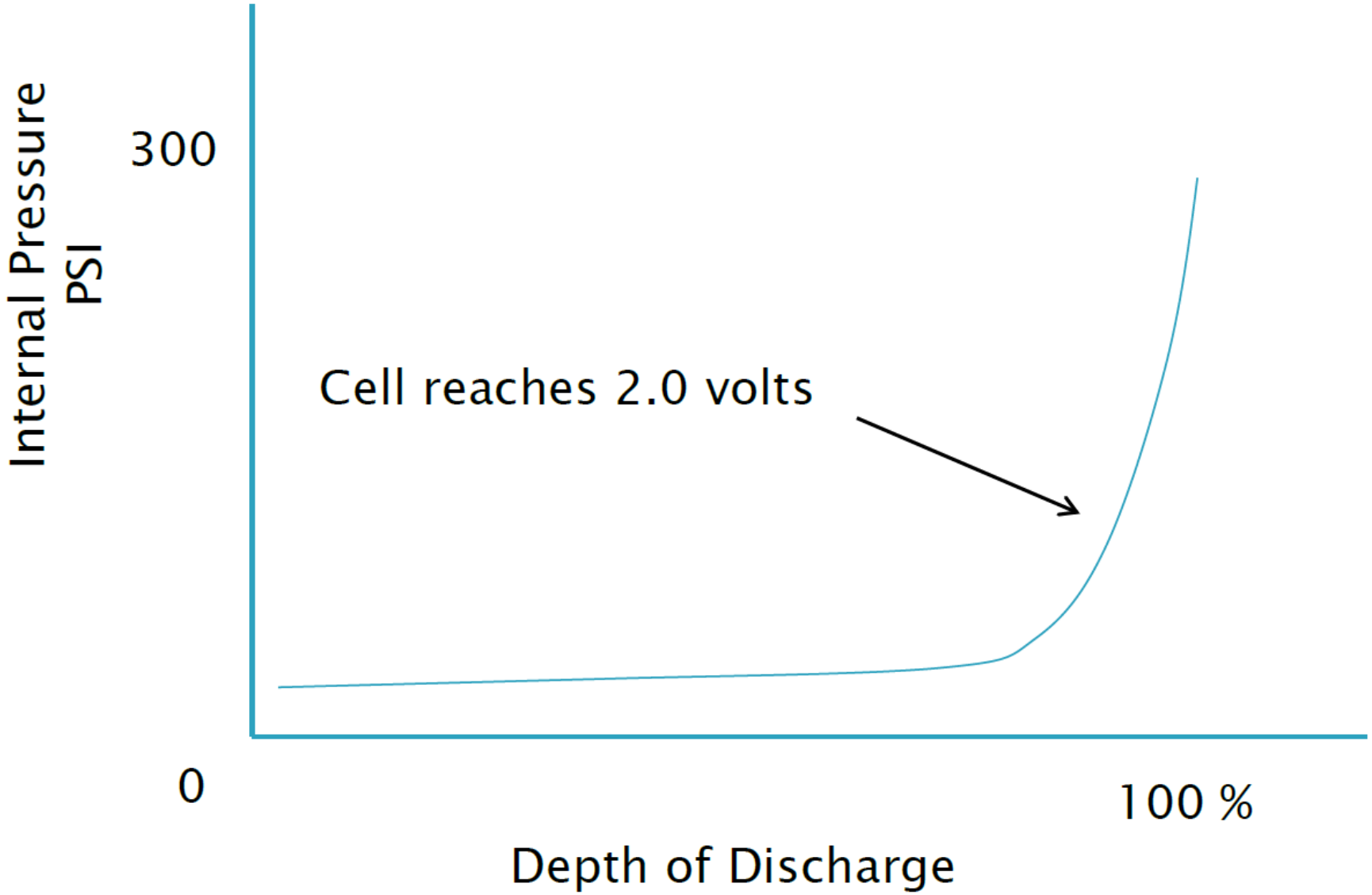



$$SOCl2 + 2Li \rightarrow 2LiCl + \tfrac{1}{2} SO_2 + \tfrac{1}{2} S + e^-$$

# Typical Discharge Profile



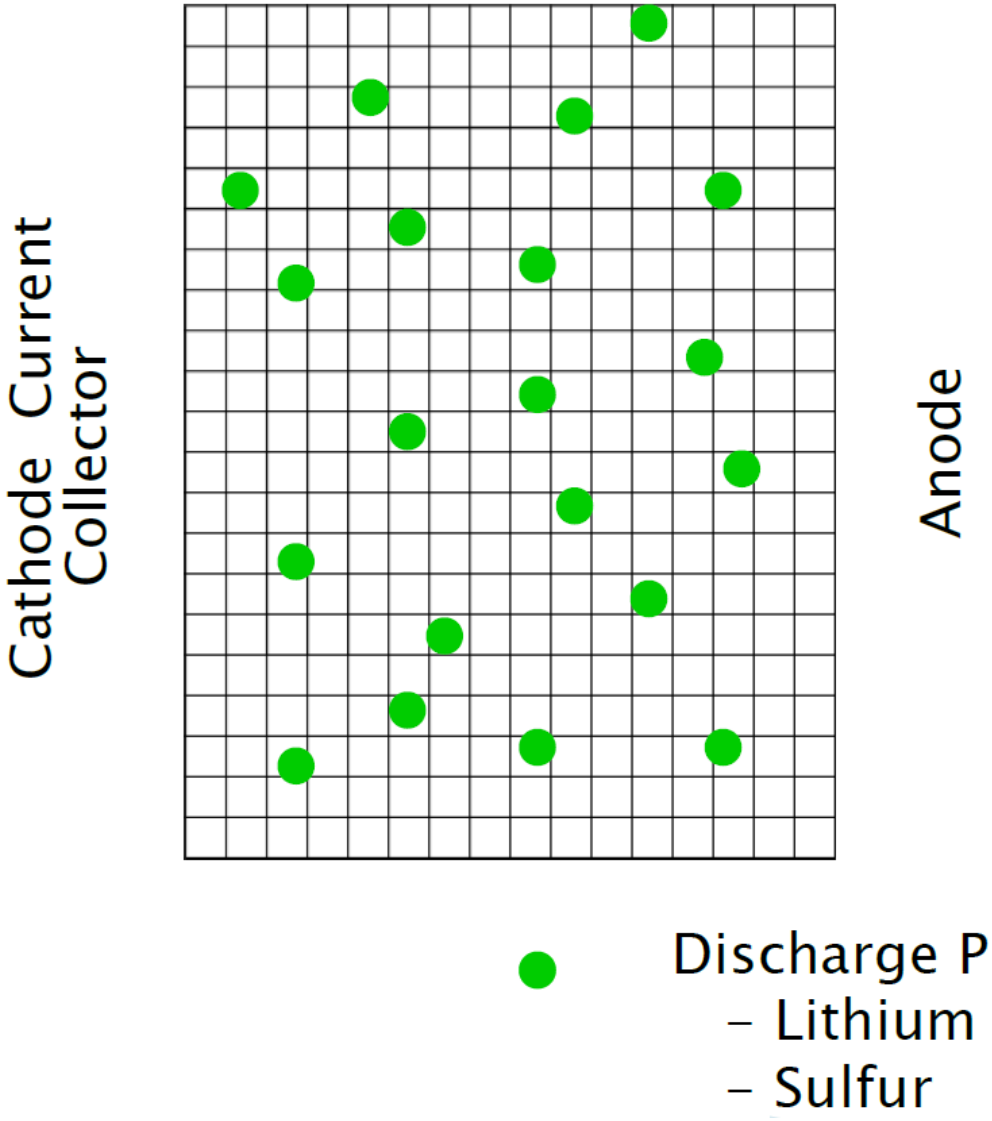
# Cell Internal Pressure



# Cathode Performance

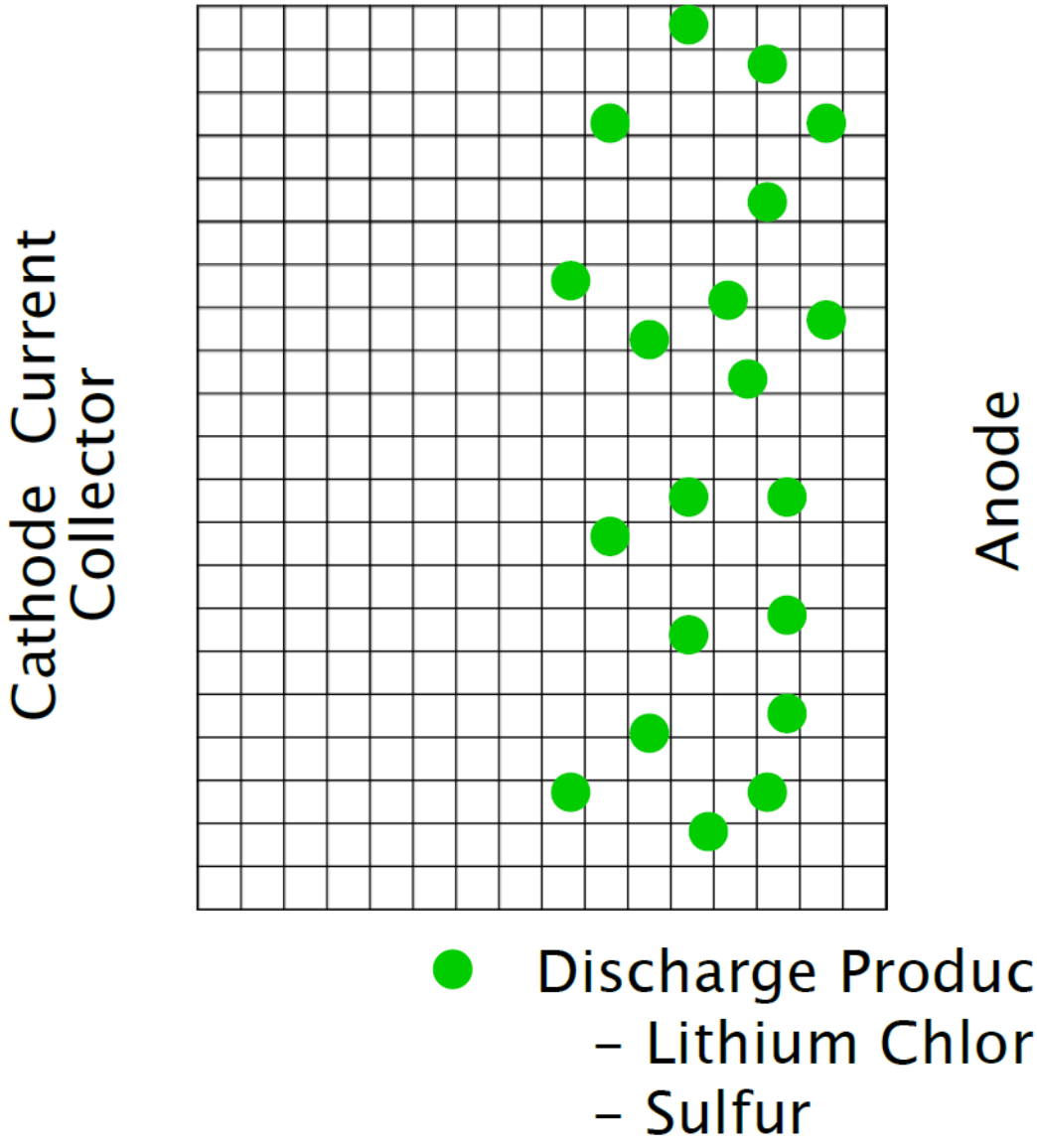
- The carbon substrate is a very large surface area matrix type structure.
- The porosity of the substrate impacts how efficiently the cell discharges.
- A Redox reaction takes place on the surface of the substrate.
- Once an individual reaction site has been used, discharge products are deposited at the site and can not be used again.
- This is not reversible process.
- Thinner cathodes are more efficient because the current collectors are closer to the reaction sites.

# Cathode - Discharge Products Concentration



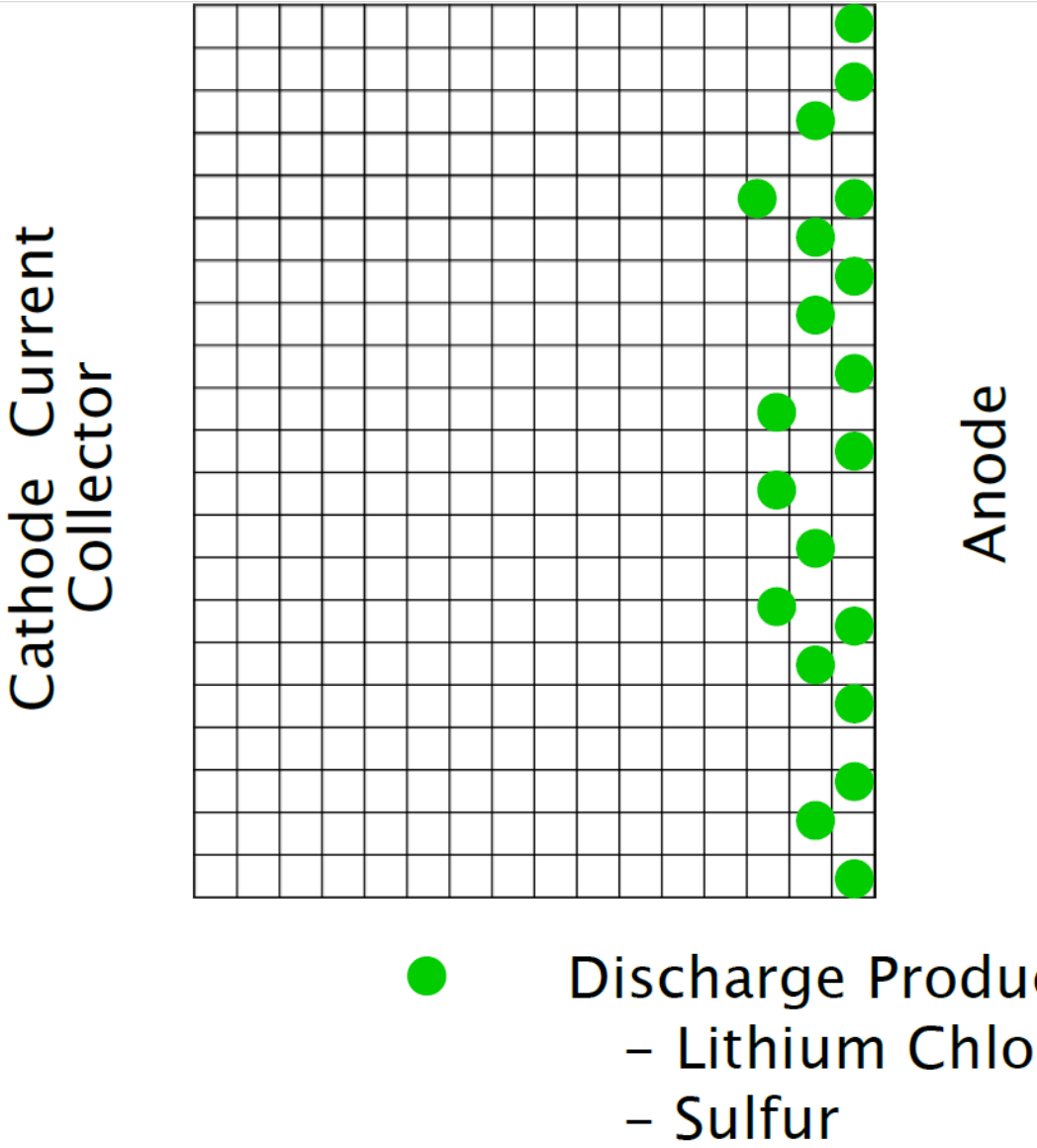

At low rates Discharge Products are evenly distributed throughout the carbon cathode matrix.

# Cathode - Discharge Products Concentration




At higher rates – Discharge products are preferentially deposited on the cathode surface nearest to the lithium anode. Thinner cathodes are therefore more efficient.

# Cathode - Discharge Products Concentration




At excessively high rates, the discharge products are deposited very near the cathode surface, blocking the remainder of the cathode from participating in the discharge reaction. This is referred to as cathode loading, cathode blocking or cathode freezeover.

# Storage Life and Passivation

- A unique aspect of the cell chemistry is its extended shelf life.
- Up to 10 years storage life with minimal capacity loss, assuming RT, and dry storage.
- Passivation is necessary for good shelf life.
- The voltage delay is the passivation layer being disturbed or “burned off” the anode surface.
- Passivation layer will reform once discharge stopped.

# Anode Passivation

- Passivation is a protective layer of salts (LiCl) that form on the anode surface when the lithium comes in contact with the electrolyte.
- This layer of salt forms at a logarithmic rate.
- The thickness of the layer depends on storage temperature.
- It is removed/reduced by discharging the cell.

# Anode Depassivation

- Depassivation is the removal of the passive salt layer to the degree that the cell can be discharged at the desired rate while maintaining the desired voltage.
- If necessary, this should only be done prior to application use, not as a maintenance activity.
- Complete removal of the passive layer will expose the anode to self discharge loss.
- Depassivation is ideally done with a variable load and constant voltage.