**Team Name:** Team Sengupta

**Project Title:** Lithium Recovery Using Ion EXchange (LiRIX)

**Objectives of Phase 2 Submission:**

Design a process that can recover Lithium from after-power brine solution as pure Lithium Hydroxide Monohydrate ($LiOH.H_2O$) crystals without Lithium Carbonate ($Li_2CO3$) as an intermediate compound at a competitive price.

**Description of the Project:**

The pretreated brine with a Lithium concentration of ≈ 200 mg/L is contacted with a synthesized Lithium-selective adsorbent. Regeneration of this adsorbent creates a much higher concentration Lithium solution but Lithium cation faces competition from other competing cations. The competing cations are removed with a train of ion exchanger resin fixed beds. Lithium hydroxide (LiOH) solution is generated which is further concentrated with a forward osmosis unit which takes advantage of the high osmotic pressure of the influent brine. All the chemicals needed for this process are generated at site by electrolysis of the brine solution.

**Potential Impact of the Project:**

1. The end product is $LiOH.H_2O$ crystals that is produced without $Li_2CO_3$ as an intermediate compound, a favored criterion of this challenge competition.
2. High purity $LiOH.H_2O$ crystals are produced at a competitive price.
3. The only chemicals used are HCl and NaOH, and both are generated at site by electrolysis of the Salton Sea brine.
4. Electrolysis of Salton Sea brine uses only electrical energy that is available from a renewable source at the site at a highly reduced rate.
5. Water usage of the proposed scheme is zero.
6. The process generates no waste product.
7. Thermal energy of the brine is harnessed to enhance process efficiency by carrying out ion exchanger regeneration at elevated temperature.
8. The chemical energy of the Salton Sea brine is harnessed as the draw solution for the forward osmosis in the last step to concentrate LiOH.