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## A New Doping Strategy for Layered Oxide Electrode Materials Used in Lithium-Ion Batteries

Tech ID: 32477 / UC Case 2020-664-0

### BRIEF DESCRIPTION

Researchers at UCI have invented a novel method that significantly improves the design and efficiency of lithium ion batteries. The invention is based on a “high entropy” or “cocktail” doping strategy, which improves the electrochemical performance of cathode materials through increasing energy density and cycle life and reducing reliance on expensive and toxic materials such as Cobalt.

### SUGGESTED USES

- Design improvement over the current lithium ion batteries (LIB) technology for the use in vehicles and grid power systems
- Cobalt free replacement over current cathode material used in LIB

### FEATURES/BENEFITS

- Longer life cycle of LIB with capacity retention of 98% after 100 cycles
- Elimination of the toxic, expensive, and single-sources cobalt
- More thermally stable doped material

### TECHNOLOGY DESCRIPTION

The advent of lithium ion batteries (LIB) has revolutionized the mobile phone and consumer electronics industry and in recent decade, it has set to overtake the electric vehicle (EV) market and the grid power systems. The current battery design, however, has inherent barriers, including, high battery cost, poor battery life as well as less than optimum performance and safety history. Further, cobalt (Co), a key element in LIB, is expensive and toxic to handle.

The researchers at the University of California, Irvine have developed a “high-entropy” method, which involves the introduction of dopants to improve the thermal stability while preventing their negative side effects. These dopants stabilize the surface layer while improving the thermal stability of the cathode material and better accommodates for the defects in the layered materials; thus improving the battery’s mechanical properties.

### STATE OF DEVELOPMENT

Research is ongoing.

### PATENT STATUS

### CONTACT

Ben Chu  
[ben.chu@uci.edu](mailto:ben.chu@uci.edu)  
tel: .



### INVENTORS

» Xin, Huolin

### OTHER INFORMATION

### CATEGORIZED AS

- » **Energy**
  - » Storage/Battery
- » **Materials & Chemicals**
  - » Chemicals
- » **Nanotechnology**
  - » Materials

### RELATED CASES

2020-664-0

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,728,482	08/15/2023	2020-664

Additional Patent Pending

#### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Laser additive manufacturing method for producing porous layers

**UCI** Beall  
Applied Innovation

5270 California Avenue / Irvine, CA  
92697-7700 / Tel: 949.824.2683



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