



# Mominur Rahman

*Alvin M. Weinberg Fellow*

## **Where and when did you earn your PhD?**

I received my PhD in chemistry from Virginia Tech in May 2021.

## **What was the subject of your dissertation?**

My dissertation focused on characterizing the depth-dependent structural and chemical processes in layered oxide cathodes for sodium-ion and lithium-ion batteries using synchrotron characterizations and formulating the design principles of stable layered oxide cathodes for these batteries.

## **What was your dissertation's major contribution to your field?**

My dissertation's major contributions were to untangle the multiscale processes taking place in battery cathodes during operation and also to reveal the design principles of battery cathodes operating under extreme conditions such as those found in outer space and nuclear reactors.

## **Who is your ORNL mentor and which group and division are you working in?**

Dr. Ilias Belharouak is my mentor. I am working in Emerging and Solid-State Batteries Group in the Electrification and Energy Infrastructures Division.

## **What will your fellowship research focus on?**

My fellowship research will focus on materials development aided by advanced characterizations for beyond lithium-ion batteries with a focus on sulfur cathodes and lithium-metal anodes. My research will tackle the fundamental issues facing these batteries such as polysulfide dissolution and lithium-metal anode reactivity, taking advantage of the state-of-the-art characterization facilities and battery manufacturing facilities available at Oak Ridge National Laboratory.

### **What is your project's expected contribution to your field?**

My project is expected to contribute to the development of the next generation of high-energy batteries utilizing cheap and abundant sulfur cathodes and high-energy lithium-metal anodes. Utilizing abundant elements will secure the battery manufacturing supply chain, and development of high-energy batteries will ensure the widespread application of batteries in electric vehicles.

### **What are your research interests?**

My research interests include electrochemistry and materials chemistry for electrochemical energy storage devices. Advanced synchrotron characterization of battery materials is also a part of my research interests.

### **What led you to science and your specific discipline?**

The fun of discovery and the chance to do something innovative led me to science. I was drawn to my specific discipline of electrochemical energy storage devices such as batteries because of the immense opportunity that batteries provide to create a carbon-neutral world and to provide clean energy to society.

### **What did you do before coming to ORNL?**

I was a postdoctoral research associate at Brookhaven National Laboratory before coming to ORNL.

### **Could you share an interesting fact or two about yourself?**

I like to explore food from different cultures around the world. To me, food is the best way to connect to a culture and learn about different people around the world.

### **What nonscience topic or activity is important to you and why?**

Spending time with my family and my kid is very important to me. To watch her grow and help her learn new things gives me purpose in life.