New AI-Linked Sodium Batteries Now Possible, Claim Indian Scientists
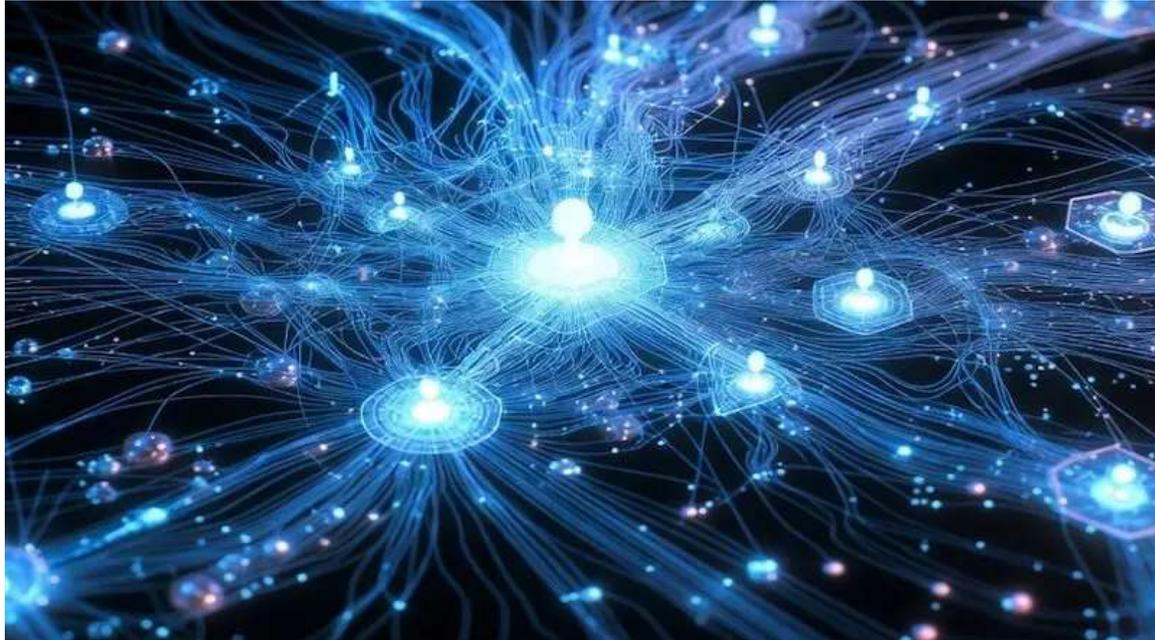
 March 11, 2026

By Subir Bhaumik a former BBC and Reuters correspondent and author of books on South Asian conflicts.

A team of researchers from IKST (Indo-Korea Science and Technology Center, Bangalore) and RISE (Research Institute for Sustainable Energy, under TCG-CREST Calcutta), have claimed they have developed a unique deep-learning tool that can accurately predict the operating voltage of battery materials.

"This will pave the way for large scale manufacturing and commercial use of next-generation sodium-ion batteries," scientist G.P Das told Eurasia Review, referring to a new study published in a top research journal, "Small Methods," by him and co-author S. Bhattacharjee.

Lithium-ion batteries dominate today's electronics and electric vehicles, but Lithium is relatively scarce and expensive, said Das. By contrast, he said sodium is abundant and cheap. Das said the problem so far has been about finding sodium-based cathode materials that are stable, high-voltage and long-lasting has been slow and costly.

"As illustrated in a comparative graphic published in our paper, Na-ion batteries promise lower cost but currently lag Li-ion in energy density," said Das. "To tackle this, our team trained a deep neural network on more than 4,300 battery materials from the Materials Project database, encoding each material with hundreds of chemically and physically meaningful descriptors."

The AI model can then "guess" the average voltage of a new battery compound in a fraction of a second—without running time-consuming quantum-mechanical simulations, says the study. It says that the model reaches a mean absolute error of just 0.24 volts on unseen data, outperforming several earlier machine-learning approaches.

The researchers went a step further and used the model as a design engine. Focusing on technologically important layered oxide cathodes for sodium-ion batteries, they proposed a series of new O3- and P2-type $NaMO_2$ compositions (where M is a mixture of transition metals) with promising voltages and satisfactory estimated stability.

For two representative candidates, the voltages predicted by the AI agreed with full density-functional-theory (DFT) calculations to within about 1–2%, and with experimental data for known commercial materials to within roughly 0.05 volts on average.

By combining high-throughput data, machine learning and selective DFT checks, the work offers an efficient "screen-then-validate" workflow that can drastically cut the time and cost needed to identify viable cathode materials.

Scientists S. Bhattacharjee and G.P. Das argue that "such AI-guided design will be critical for bringing about effective sodium-ion batteries.

"This will be seen as a strong, low-cost complement to lithium-ion technology. We envisage the large-scale use of sodium batteries in grid storage, electric mobility and renewable energy integration."

The two scientists are optimistic about the early commercial use of their discovery. "It will have a huge impact in the commercial battery market," said G.P Das.