*Supporting Information for*

Building better dual-ion batteries

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Gravimetric (mAh g−1) (S1)

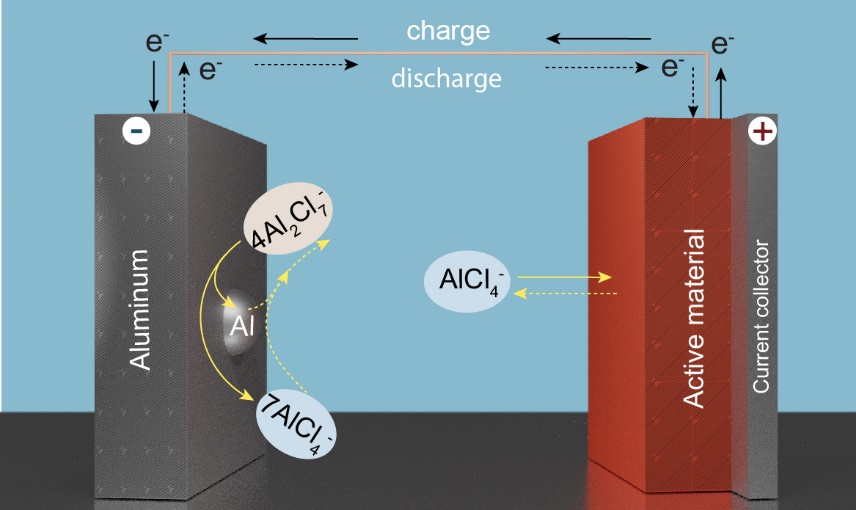
Volumetric (mAh mL-1) (S2)

mAh mol−1 (Faraday constant), and are molarities (mol L−1) of the electrolyte in discharged () and charged () state of the battery, is the density of the electrolyte in g mL-1 and is the charge of the electroactive species in the electrolyte ( = 1 for systems comprising monovalent ions).

Gravimetric (mAh g−1) (S3)

Volumetric (mAh g−1) (S4)

is the molar mass of AlCl3 in g mol-1, is the molar mass of Cl- source (for example 1-ethyl-3-methylimidazolium chloride, 1-butyl-3-methylimidazolium chloride orHCl in the simplest case) in g mol-1, is the AlCl3:XCl molar ratio and is density of the chloroaluminate-based anolyte in g mL-1.



**Figure S1.** Schematic of the charging and discharging processes of Al DIB.