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## LIST OF ABBREVIATIONS

|                               |                                          |
|-------------------------------|------------------------------------------|
| LIBs                          | Lithium-ion batteries                    |
| EVs                           | Electric vehicles                        |
| Li-ion                        | Lithium-ion                              |
| LiFePO <sub>4</sub>           | Lithium iron phosphate                   |
| LiMBO <sub>3</sub>            | Lithium-metal borate                     |
| NMC                           | Lithium nickel manganese cobalt oxide    |
| Li <sub>2</sub> O             | Lithium oxide                            |
| B <sub>2</sub> O <sub>3</sub> | Boron trioxide                           |
| ESD                           | Energy Storage Devices                   |
| EES                           | Electrochemical Energy Storage           |
| ESS                           | Energy Storage Systems                   |
| FCs                           | Fuel Cells                               |
| LBO                           | Lithium-borate-based Glass               |
| V <sub>2</sub> O <sub>5</sub> | Vanadium Pentoxide                       |
| Ni-Co                         | Nickel-Cobalt                            |
| Na-ion                        | Sodium-ion Batteries                     |
| K-ion                         | Potassium-ion Batteries                  |
| Ni-Cd                         | Nickel-Cadmium Batteries                 |
| Ni-MH                         | Nickel-Metal Hydride Batteries           |
| XAS                           | X-ray Absorption Spectroscopy            |
| In-situ XAS                   | In-situ X-ray Absorption Spectroscopy    |
| EXAFS                         | Extended X-ray Absorption Fine Structure |
| EIS                           | Electrochemical Impedance Spectroscopy   |
| SEI                           | Solid Electrolyte Interface              |
| SSE                           | Solid-State Electrolyte                  |
| PVD                           | Physical Vapor Deposition                |
| CVD                           | Chemical Vapor Deposition                |

## LIST OF ABBREVIATIONS (Continued)

|                                   |                                      |
|-----------------------------------|--------------------------------------|
| Pt                                | Platinum                             |
| ODS                               | Oxide-Dispersion Strengthened        |
| XRD                               | X-ray Diffraction                    |
| CV                                | Cyclic Voltammetry                   |
| SOC                               | State of Charge                      |
| AC                                | Alternating Current                  |
| $I_p$                             | Peak Current                         |
| NaCl                              | Sodium Chloride                      |
| RC                                | Resistor-Capacitor                   |
| $\text{Li}_2\text{CO}_3$          | Lithium Carbonate                    |
| $\text{H}_3\text{BO}_3$           | Boric Acid                           |
| NiO                               | Nickel (II) Oxide                    |
| $\text{Co}_3\text{O}_4$           | Cobalt (II, III) Oxide               |
| XANES                             | X-ray Absorption Near Edge Structure |
| PP                                | Polypropylene                        |
| $\text{LiPF}_6$                   | Lithium Hexafluorophosphate          |
| EC                                | Ethylene Carbonate                   |
| DMC                               | Dimethyl Carbonate                   |
| $\text{LiBO}_3$                   | Lithium Borate                       |
| RT                                | Room Temperature                     |
| CB                                | Carbon Black                         |
| PVDF                              | Polyvinylidene Fluoride              |
| MW                                | Molecular Weight                     |
| ECCCM                             | Electric Coin Cell Crimping Machine  |
| BTS                               | Battery Testing System               |
| CBO                               | Cross-Beam Optics                    |
| SLRI                              | Synchrotron Light Research Institute |
| $\text{Li}_2\text{B}_4\text{O}_7$ | Lithium Tetraborate                  |

## LIST OF ABBREVIATIONS (Continued)

|                                          |                                                |
|------------------------------------------|------------------------------------------------|
| $\text{Li}_6\text{B}_4\text{O}_9$        | Lithium Hexaborate                             |
| $\text{LiBO}_2$                          | Lithium Metaborate                             |
| $\text{B}_2\text{O}_3$                   | Boron Trioxide                                 |
| ICE                                      | Initial Coulombic Efficiency                   |
| $\text{mAh/g}$                           | Milliampere-hour per gram                      |
| $\text{mWh/g}$                           | Milliwatt-hour per gram                        |
| $\alpha\text{V}_2\text{O}_5$             | Alpha-phase Vanadium Pentoxide                 |
| $\delta\text{-LiV}_2\text{O}_5$          | Delta-phase Lithium Vanadium Pentoxide         |
| $\gamma\text{-Li}_2\text{V}_2\text{O}_5$ | Gamma-phase Lithium Vanadium Pentoxide         |
| $\text{Li}_2\text{CoNiO}_4$              | Lithium Cobalt Nickel Oxide                    |
| $\text{Li}_2\text{CoO}_2$                | Lithium Cobalt Oxide                           |
| $\Delta E$                               | Energy difference at the absorption edge       |
| K-edge                                   | Absorption edge related to the K-shell         |
| $\text{CoO}$                             | Cobalt (II) Oxide                              |
| $\text{Co}_3\text{O}_4$                  | Cobalt (II, III) Oxide                         |
| $\text{VO}_2$                            | Vanadium (IV) Oxide                            |
| $S_0^2$                                  | Scattering amplitude reduction factor          |
| $\sigma^2$                               | Debye-Waller factor                            |
| $\Delta E^0$                             | Energy shift at the absorption edge            |
| N                                        | Coordination number                            |
| TM-XAS                                   | Transition Metal X-ray Absorption Spectroscopy |
| $\text{Li}^+$                            | lithium ions                                   |
| $\Delta E_p$                             | The redox peak separation                      |
| $\text{Li}_6\text{B}_4\text{O}_9$        | Lithium Hexaborate                             |