

KEEPING UP WITH BATTERIES

We have sifted through 1000s of articles on lithium-ion batteries for you! We have captured pretty much everything new and important that came out in *December 2017*. We have selected and categorized commercially-relevant articles, added some interesting news, and squeezed all this content into our comprehensive review.

Hope it makes your work easier and keeps you in touch with the battery literature!






The Research Interfaces Team

ANODE



Soluble polyimide binder for Si/graphite anodes	link		Si		
Stretchable conductive polymer binder for Si anodes	link		Si		
Properties of PPy as binder in Si composite anodes	link		Si		
Spherical Si/C granules with 3D conducting networks	link		Si		
Functionalized PEG binder for Si nanoparticle anode	link		Si		
Flexible butyl-connected polymer binders for Si/graphene anodes	link		Si		★
Si/carbon composite anode materials for Li-ion battery	link		Si		
Porous graphene/Si current collectors as anodes	link		Si		
Li ⁺ migration in Si-graphene complex using ab initio	link		Si		
Si@SiO _x /graphene nanosheet composites by ball milling	link		Si		
Si/CNT spheres synthesized by rotary spray drying	link		Si		
Deposition of Al ₂ O ₃ films on Si nanowires via reactive ion-etching	link		Si		
Amorphous Si-island/GO thin-film anode	link		Si		
Si-WO ₃ -C composite as anode material	link		Si		
FEC as directing SEI agent in a-Si anodes	link		Si		★
LIPON as artificial SEI layer on pure Si thin-film anodes	link		Si, SSB		
Interfaces between Si anodes and garnet electrolytes	link		Si, SSB		

LEGEND

-  – link to the article or website
-  – collaboration with industry
-  – type of Li-ion battery
-  – open access
-  ★ – review article or highlight

TYPES OF LI-ION BATTERIES

- Si – silicon anode
- Li M – lithium metal anode
- SSB – solid-state Li-ion battery
- M PO₄, TMO... – metal phosphate, transition metal oxide, ... (cathode/anode chemistries)
- LFP, NMC, NCA, ... – cathode chemistries

*Other abbreviations are chemistry or materials specific and commonly used throughout the field (such as chemical elements and formulas). If you are unclear, please click on the link and see.

**Mistakes are unavoidable, so please forgive us if you find any.

Synthesis of Co-oxide powders by carbothermal reduction	link	TMO
Co ₃ O ₄ nanowire/graphene composite as anode material	link	TMO
Structural evolutions of Cu-substituted Co ₃ O ₄	link	TMO

TiO ₂ /Co ₃ O ₄ as anode material	link		TMO	 PDF
Double-shelled Co ₃ O ₄ @TiO ₂ @C as anode material	link		TMO	
Built-in electric field in C-doped Co ₃ O ₄ nanocrystals	link		TMO	
Cu-doped α-Fe ₂ O ₃ microspheres as anode material	link		TMO	
Fe ₃ O ₄ NP/rGO nanocomposites as anode material	link		TMO	
Understanding Fe ₃ O ₄ -polymer composite anodes	link		TMO	
Hierarchical Fe ₃ O ₄ @porous carbon matrix as anode material	link		TMO	
Nanogranular WO ₃ with excess oxygen as anode material	link		TMO	
Mn ₃ O ₄ /graphene nanocomposite as anode material	link		TMO	 PDF
Porous MgCo ₂ O ₄ nanosheets as anode material	link		TMO	
Li ₃ V(MoO ₄) ₃ as anode material	link		TMO	
Ternary Li ₂ Mo ₄ O ₁₃ as anode material	link		LMO	
Carbon-coated Li ₄ Ti ₅ O ₁₂ synthesized by sol-gel	link		LTO	
Hard carbon-Li ₄ Ti ₅ O ₁₂ composite anodes	link		LTO	
LiDFOB additive for stabilizing FEC-graphite interface	link		LNMO	
Sb-based materials as promising anodes for Li-ion	link			
SnO ₂ /graphene nanocomposite as anode material	link			
Surface modification of SnO ₂ by carbon coatings	link			
Sn ₄ P ₃ /graphite composite studied by XAS	link			
Conductive binder for Sn anodes	link			
C-coated SiO/Cu composite as anode material	link			
Li ₂ TiSiO ₉ /graphite nanocomposite as anode material	link			
Ni- and Zn-doped MnCO ₃ as anode material	link		M CO ₃	
DMS as SEI-forming additive in Li-anode cells	link		Li M	
Interface modification of Li ₁₀ GeP ₂ S ₁₂ electrolyte and Li anode	link		Li M, SSB	
Amorphous C@graphite recycled from spent graphite anodes	link			
Graphite modification using microwave-irradiation combustion	link			
Quantitative detection of Li plating on graphite anodes	link			
Optimizing SEI on graphite anode with ionic liquid	link			
Understanding nitrile stabilization of HV electrode interfaces	link			
Formation of SEI in aqueous electrolytes	link			
Bulk properties of amorphous Li dendrites	link			
Functionalized ethers in Li-ion batteries	link			 
 ELECTROLYTE				 
Anomalous transport properties at solid-state interfaces	link		SSB	
MD simulations of ionic transport at solid-state grain boundaries	link		SSB	
3D chemical analysis of interphases at solid electrolyte interface	link		SSB	
Li ⁺ conduction in perovskite-structured solid electrolytes	link		SSB	
Evolution of Boson peak in superionic glasses	link		SSB	
Properties of Li ₃ OCl by first-principles DFT calculations	link		SSB	

PEO/garnet composite electrolytes for solid-state batteries	link		SSB	★
Interfaces between Si anodes and garnet electrolytes	link		Si, SSB	
Surface modification of Li ₂ ZTO by liquated Na ₂ MoO ₄	link		SSB	
Nb and Y co-doping of LLZO	link		SSB	
Doping of LLZO for optimum Li ⁺ migration channel size	link		SSB	
3D bicontinuous LAGP-epoxy electrolyte	link		SSB	🔒
Microwave-assisted reactive sintering of LATP ceramics	link	🏗️	SSB	
Interface modification of Li ₁₀ GeP ₂ S ₁₂ electrolyte and Li anode	link		SSB	
Properties of Li _{3/8} Sr _{7/16-3x/2} La _x Zr _{1/4} Nb _{3/4} O ₃ solid electrolyte	link		SSB	
Si substitution in superionic Li-argyrodites	link		SSB	
Li ⁺ conduction in atom-deficient closo-type complex hydrides	link		SSB	
ALD of lithium niobium oxides as solid-state electrolytes	link		SSB	
Neutron diffraction study on Li ₃ PO ₄ solid electrolyte	link		SSB	
Gel polymer electrolytes for Li-ion batteries	link		LiPo	🔍 ★
Influence of additives in PVDF-based solid polymer electrolyte	link		LiPo	🔒
Waterborne PU-based solid polymer electrolyte	link		LiPo	
PVDF/HEC polymer electrolyte for HV Li-ion batteries	link	🏗️	LiPo	
GO filler for PAN-LiClO ₄ flexible solid polymer electrolyte	link		LiPo	
PAN/montmorillonite membrane as gel polymer electrolyte	link		LiPo	
In situ polymerized gel electrolytes for flexible batteries	link	🏗️	LiPo	🔒
Double polymer network for improved stability of Li-metal anode	link		LiPo, Li M	
Functional additives for HV LNMO batteries	link		LNMO	
Partially fluorinated ether as co-solvent for improved stability	link	🏗️	LNMO	
LiDFOB additive for stabilizing FEC-graphite interface	link		LNMO	🔒
Sulfolane and LiDFOB electrolyte for LNMO cathodes	link		LNMO	🔒
Impact of LiBF ₄ and LiDFOB on storage at elevated temperature	link		NCA	
Electrolyte additives to stabilize HV cathode-electrolyte interface	link	🏗️	NMC	
BDTD electrolyte additive for HV performance of NMC532	link	🏗️	NMC	
Comparison of imide-based Li salts as electrolyte additives	link		LFP	🔒 ★
Formation of SEI in aqueous electrolytes	link	🏗️		
Auger electron spectroscopy study of SEI interfaces	link			
Optimizing SEI on graphite anode with ionic liquid	link			
Ionic liquid vs conventional electrolytes in battery at 80 °C	link		LFP	🔒
TMSP electrolyte additive to improve cycling at elevated temperature	link			🔒 PDF
Concentrated electrolyte with fire-extinguishing properties	link			★
S-containing solvents in LiDFOB-based HV electrolyte	link			
Understanding nitrile stabilization of HV electrode interfaces	link			
Ionic transport in polyether-based electrolytes	link			
Visualizing ion diffusion in battery by fluorescence microscopy	link			
Functionalized ethers in Li-ion batteries	link			🔒 🔍

 NEWS BOX

Toyota Plans to Roll Out 10 All-electric Vehicles ([Fortune](#))



Toyota Deepens Panasonic Battery Ties in Electric-car Rush ([Bloomberg](#))

"While Nissan Motor Co. has sold some 300,000 of the all-electric Leaf since 2010 and Tesla Inc. has delivered more than 250,000 EVs since the first Roadster rolled out in 2008, neither Toyota, Mazda nor Suzuki offer battery-powered passenger cars."

Ford Ramps up Electric Vehicle Push in China Amid Slowing Sales ([Reuters](#))

"China is pushing automakers toward electric and hybrid petrol-electric vehicles, setting tough quotas for new energy vehicles that come into play in 2019, and has signaled a longer-term shift away from traditional internal combustion engine cars."




















Tesla Isn't the Only Company Creating Cool Electric Vehicles Anymore ([The Washington Post](#))

 SEPARATOR


Biaxial mechanical behavior of polymer separators	link			★
Redox-active separator for Li-ion battery	link		LFP	🔒
Modified PP separator using polyphenol-derived coating	link			
Plasma-modified PP separator	link			
PP/hydrophobic silica aerogel composite separator	link			
Carboxylated polyimide separator with improved rate capability	link			
Composite nanofiber membrane with improved thermal stability	link		LCO	
PEI shutdown separator made by micro-melting technique	link	🏠		
Ether modified PEEK membrane as battery separator	link			
Functionalized ethers in Li-ion batteries	link			🔒 🔍

 CATHODE

Anionic/cationic redox in Li-rich cathodes	link		NMC	🔒	★
Spray pyrolysis of nickel-rich NMC cathodes	link		NMC		
Combustion synthesis of layered NMC111	link		NMC		
Bulk anion redox mechanism in Li-rich NMC	link	🏠	NMC	🔒	
Al ₂ O ₃ coating on Mn-rich cathodes	link		NMC		
Al and Zr co-doping of NMC cathodes	link		NMC		
Electrolyte additives to stabilize HV cathode-electrolyte interface	link	🏠	NMC		

BDTD electrolyte additive for HV performance of NMC532	link		NMC		
Investigation of commercial carbon additives in NMC532	link		NMC	 PDF	
Origin of intra-granular cracking in NMC811 cathodes	link		NMC		★
Surface, bulk behavior, and thermal properties of NMC materials	link		NMC		
NMC111 interstitial layer to stabilize NCA cathode	link		NCA, NMC		
LiAlO ₂ -coated NCA cathode for improved thermal stability	link		NCA		
Electrochemical and thermal stress in NCA cathode	link		NCA		
Water-resistant TiO_x-coated NCA particles for cathode processing	link		NCA		★
Analysis of delithiation in LNO and NCA cathodes	link		NCA, LNO		
Hydrothermal synthesis of monoclinic and orthorhombic LMO	link		LMO		
First principle theoretical study of Li _{1-x} Ni _{0.5} Mn _{1.5} O ₄	link		LNMO	 PDF	
Effect of ball milling conditions on properties of LNMO	link		LNMO		
LaF ₃ surface modification of spinel LNMO cathode	link		LNMO		
cPAN surface modification of LNMO cathode	link		LNMO	 PDF	
LNMO cathode materials with excess amount of Li	link		LNMO		
WO ₃ doping of Li-rich LNMO	link		LNMO		
Properties of Li _{1.2} Ni _{0.2} Mn _{0.6} O ₂ with Cr doping	link		LNMO		
Sulfolane and LiDFOB electrolyte for LNMO cathodes	link		LNMO		
HV LiNiCrMnO cathode for wide temperature operation	link		LNMO		
Dimensionally stable LiCoMnO ₄ cathode	link		LCMO		
High capacity Li- and Mn-rich cathode materials	link				 ★
Electrochemical site-selective doping in Mn-rich oxide cathodes	link				
Controllable SEI in Ni-rich cathodes	link				
Multi-functional ALD coating of LiCoO ₂ cathode	link		LCO		
LiCoO ₂ particle distribution in discarded cell phone batteries	link		LCO		
Carbon-coated Li ₃ Cr ₂ (PO ₄) ₃ as cathode material	link		M PO ₄		
Carbon-coated LiFe _{0.5} Co _{0.5} PO ₄ as cathode material	link		M PO ₄		
Microwave synthesis of LiFe _{1-x} Mn _x PO ₄ cathode	link		M PO ₄		
Combustion synthesis of Li _x Mn _{2-y} Fe _y O _{4-z} Cl _z cathode	link				
Li ₃ V ₂ (PO ₄) ₃ @MWCNTs@C nanocomposite as cathode material	link		LVP		
Modeling of temperature-dependent degradation in LFP	link		LFP		
Modeling of LFP battery OCV hysteresis	link		LFP		
Organic secondary coating for carbon-coated LiFePO ₄ cathode	link		LFP		
Hydrothermal synthesis of LiFePO ₄ /C composites	link		LFP		
Effect of Li ₃ PO ₄ and Li ₄ P ₂ O ₇ on LiFePO ₄ cathode performance	link		LFP		
Ni-doped LiFeBO ₃ /C composites as cathode material	link				
Iron and oxygen redox in Li-rich anti-fluorite Li₅FeO₄	link		TMO		★
Scalable synthesis of V ₂ O ₅ /CNT cathode composite	link		TMO		
Limits of cationic and anionic redox of Li ₂ MO ₃	link		TMO		
Dissolution, migration, and deposition of transition metal ions	link				★
Polyanthraquinone/CNT composite as cathode material	link				

 NEWS BOX

The Latest Bull Case for Electric Cars: the Cheapest Batteries Ever ([Bloomberg](#))

"Lithium-ion battery packs are selling at an average price of \$209 a kilowatt-hour, down 24 percent from a year ago and about a fifth of what it was in 2010, a Bloomberg New Energy Finance survey shows."

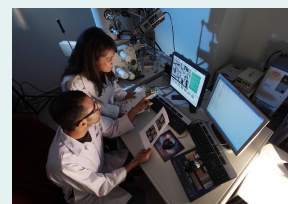
Autonomous Cars Need Tougher Batteries, Lithium-ion Pioneer Says ([Bloomberg](#))

Honda and Nissan Said to Be Developing Next-generation Solid-state Batteries for Electric Vehicles ([The Japan Times](#))

"Toyota said it is in talks with Panasonic Corp. to team up on developing and producing lithium ion and next-generation solid-state batteries."

Solid Power, BMW Partner to Develop Next-generation EV Batteries ([Reuters](#))

Akasol Opens up Europe's Largest Battery Production Facility for Commercial EVs ([Greentech Media](#))


 MODELING, CHARACTERIZATION & FABRICATION


Li ion migration in Si-graphene complex using ab initio	link		Si		
Ab initio modeling of atom insertion into electrode materials	link				
Formation of SEI in aqueous electrolytes	link				
MD simulations of ionic transport at solid-state grain boundaries	link		SSB		
Properties of Li ₃ OCl by first-principles DFT calculations	link		SSB		
Analysis of delithiation in LNO and NCA cathodes	link		LNO, NCA		
Prediction of interstitial diffusion of N, O, B and C in metals	link				
Dissolution, migration, and deposition of transition metal ions	link				
Nanoscale evolution of interface during electrodeposition	link				
Quantitative detection of lithium plating on graphite anodes	link				
Auger electron spectroscopy study of SEI interfaces	link				
TEM imaging of metastable reaction pathways in lithiated Co ₃ O ₄	link				
Understanding nitrile stabilization of HV electrode interfaces	link				
Electrolyte additives to stabilize HV cathode-electrolyte interface	link		NMC		
Visualizing ion diffusion in battery by fluorescence microscopy	link				
SS NMR studies of ion dynamics in Li-ion conductors	link		SSB		
Anionic/cationic redox in Li-rich cathodes	link		NMC		
EIS for probing lithiation kinetics in reaction-limited battery electrodes	link				
Initialization of algorithm for estimation of battery parameters	link				
Physical-based electrical model of Li-ion battery	link				

Solid-state thin-film Li-ion battery fabricated by magnetron sputtering	link	SSB	
Aerosol-spray pyrolysis of nanostructured materials for batteries	link		🔍
Synthesis of hierarchically ordered metal oxides	link		

OTHER BATTERY TECHNOLOGIES



Metal-organic frameworks for electrochemical energy storage	link		🔒	🔍
Design of complex nanomaterials for energy storage	link			🔍★
Materials design for flexible rechargeable batteries	link			🔍
Status and challenges in printed batteries	link		🔒	🔍
Nanoscale circuitry of battery electrodes	link			🔍
Naturally derived materials for electrochemical energy storage	link		🔒	🔍
Dual-graphite battery using concentrated organic electrolytes	link			
Batteries for EVs	link			🔍
Status and challenges in Li-metal batteries	link	Li M		🔍★
High energy-density batteries based on Li metal anodes	link	Li M		🔍
Electrochemical interphases of reactive metal anodes	link	Li M		🔍
Li-ion capacitors using sacrificial organic lithium salt	link	LIC		
Nanocomposite materials for Na-ion batteries	link	Na-ion		🔍
Comparison of battery technologies for high-T stationary applications	link	Ni/MH, Ni-Cd	🔒	

NEWS BOX



Tesla mega-battery in Australia activated ([BBC](#))

'Mr Musk said that if the 100-megawatt battery wasn't built within 100 days, the state would receive it for free. The countdown began on 30 September after a plan was approved by the state government and regulators. Tesla finished the battery in about 60 days.'

Honda Is Working on Bi-directional Charging Technology for Its Electric Vehicles ([Electrek](#))