

**Product
Information**

HED™ NCMs

Superior Quality Cathode Materials

BASF offers a portfolio of application specific cathode materials to support high energy density, safety, and improved efficiency for lithium-ion batteries.

Typical	
Appearance	Black Powder
Nominal Molecular Formula	$\text{Li}_{1+x}(\text{Ni}, \text{Co}, \text{Mn})_{1-x}\text{O}_2$
Surface Area, m^2/g	<0.5
Tap Density, g/cm^3	≥ 2.0
D99, μm	<28
D50, μm	8-13
D10, μm	>4

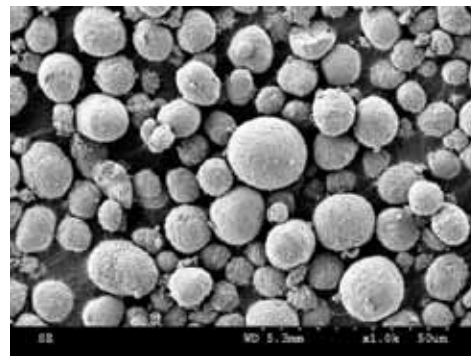
Features & Benefits

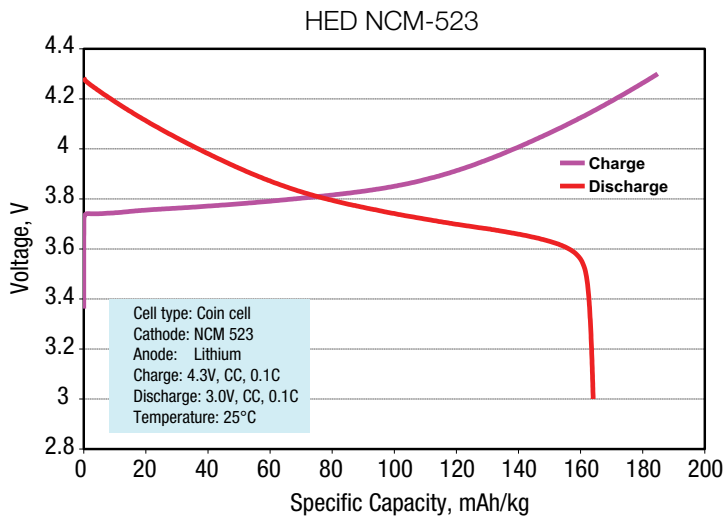
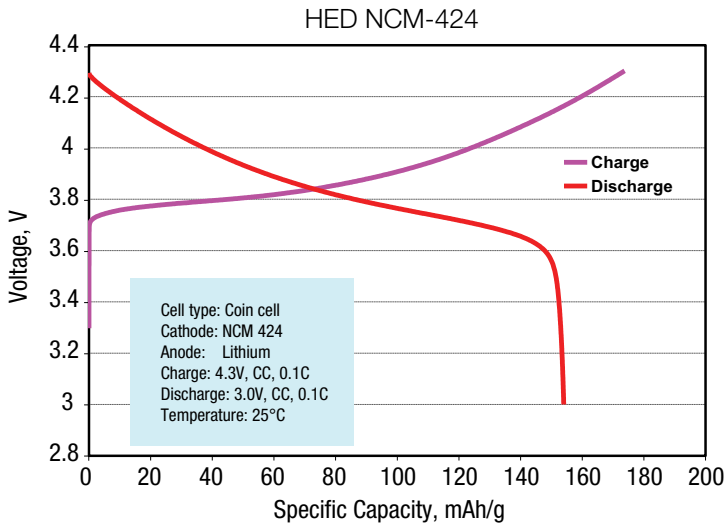
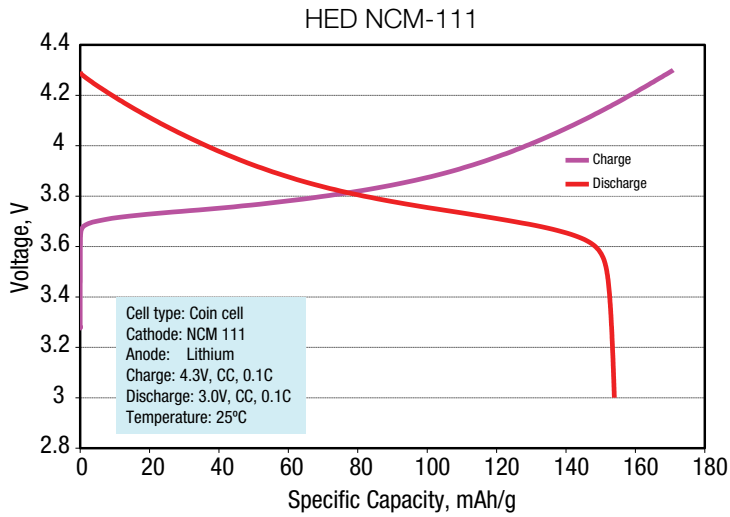
BASF's HED family of Li-stabilized NCM cathode materials offers customers a unique combination of energy, power, safety, and cost for high performance lithium-ion batteries. BASF offers three pilot plant products – NCM-111, NCM-424, and NCM-523 – with varying ratios of Ni:Co:Mn. We also offer pilot plant samples of our next generation cathode material, HE-NCM, to selected customers.

Key attributes and benefits of BASF's Transportation Grade cathodes include:

- Highest purity (especially Fe and Cr) leading to improved cycle life
- Excess Li (Li/Metal > 1) leading to improved rate and cycle life
- All BASF NCM cathode materials are covered under a global license from Argonne National Laboratory (ANL), Chicago, USA

BASF is one of two global licensed cathode suppliers of the U.S. Department of Energy's ANL patented NCM cathode material, which employs a unique combination of lithium and manganese-rich mixed metal oxides. The license covers the broadest scope of NCM chemistry, which can be used in today's and future lithium-ion batteries.





HED is a trademark of BASF.

Although all statements and information in this publication are believed to be accurate and reliable, they are presented gratis and for guidance only, and risks and liability for results obtained by use of the products or application of the suggestions described are assumed by the user. NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE REGARDING PRODUCTS DESCRIBED OR DESIGNS, DATA OR INFORMATION SET FORTH. Statements or suggestions concerning possible use of the products are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that toxicity data and safety measures are indicated or that other measures may not be required. © 2011 BASF

What makes us unique?

- Global customer support
- Exceptional product quality & purity
- Long-term commitment to the battery market
- Financial strength of BASF