



Niobium in
Emerging Automotive

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Contents

- Solving Next Generation Auto Challenges
- Why Niobium Supports Next Generation Auto
- Next Generation Niobium Applications
- Niobium use in Auto Tomorrow
- Niobium Applications Beyond Auto

Solving Next Generation Auto Challenges

- Niobium Automotive Materials Technology has a specific role to play in
 - Lightweighting
 - Autonomous driving
 - Future fuel technology
 - Connectivity
 - Mass-market affordability

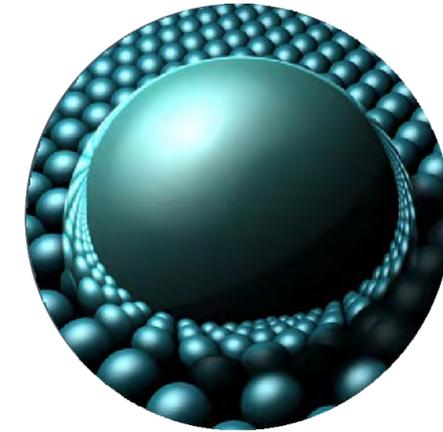
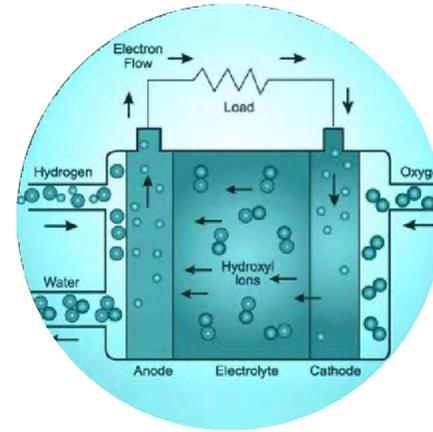
Why the Niobium Story Matters

*“From spacecraft to pipelines,
Niobium’s success across a range of industries
is key to the potential for
emerging automotive OEM’s”*

Niobium - Part of Next Generation

- Niobium is already proven in many high tech applications
- The culture of technology partnership is central to strategy
- Non-traditional thinking in product development
- Confidentiality is central to innovative R&D

Next Generation Niobium Applications



Clean technologies

Fuel Cell Technologies

Li-ion Batteries

Super capacitors

Brake applications*

Mechatronic wedge brake

Rain Brake Support (RBS)

*Maintenance free brake

Advanced technologies

Thermo electric generators

Self-cleaning surfaces - automotive glass

Electrochromic materials - colour, transparency, thermal control and display

Light emission diodes - LED lights

Niobium Use in Auto Tomorrow

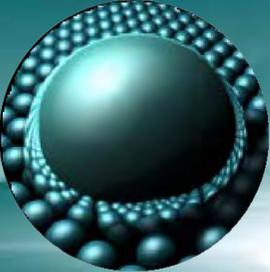
Mechatronic Brakes



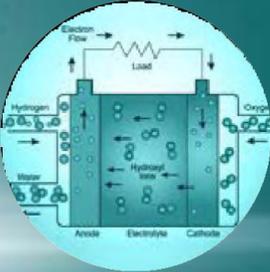
Li-Ion Batteries



Self Cleaning Surfaces



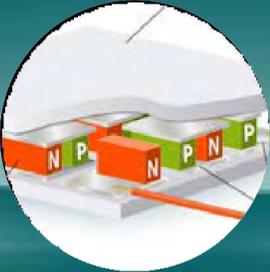
Fuel Cell



Supercapacitor

Thermoelectric Generator

Rain Brake Support



Examples of Niobium use Beyond Auto

- Satellite micro propulsion systems
- Superconductors for MRI medical diagnostics
- High tech lenses which are thinner and lighter
- Superalloys for aero engines
- Niobium Nanowires for wearable monitoring
- Structural steel for wind towers, ship building, train rails and wheels, energy transmission towers, construction beams and offshore drilling platforms
- Niobium super cavities for particles accelerators
- Chemical catalytic converters
- H₂O Splitting - renewable hydrogen production from water

