



# DSM solution for 3D MID

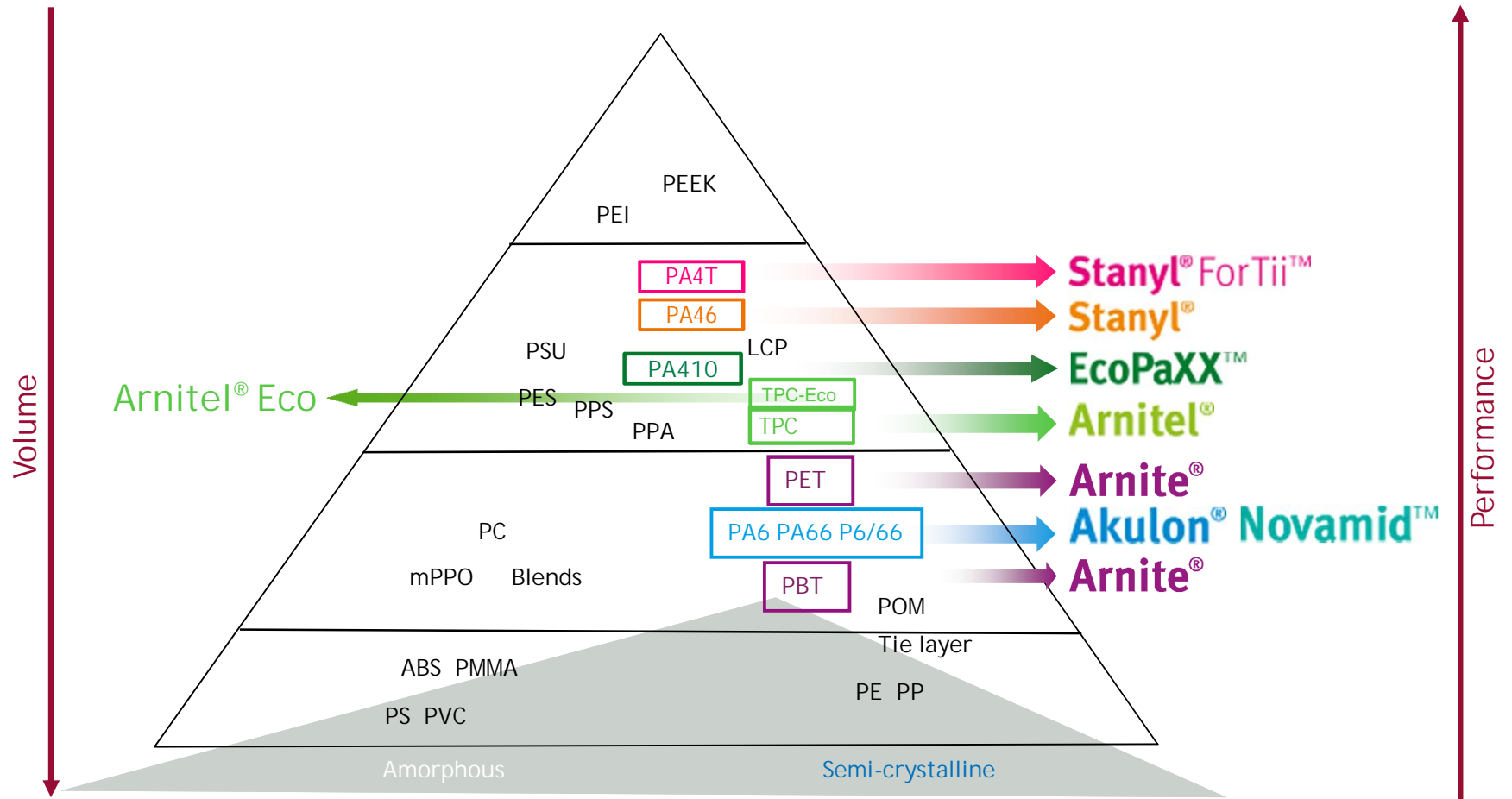
May 2014 – 3D MID forum

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DSM Engineering Plastics

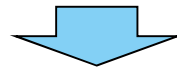
# DSM product portfolio

- PA4T extends range of high performance thermoplastics -



# Trends in electronics

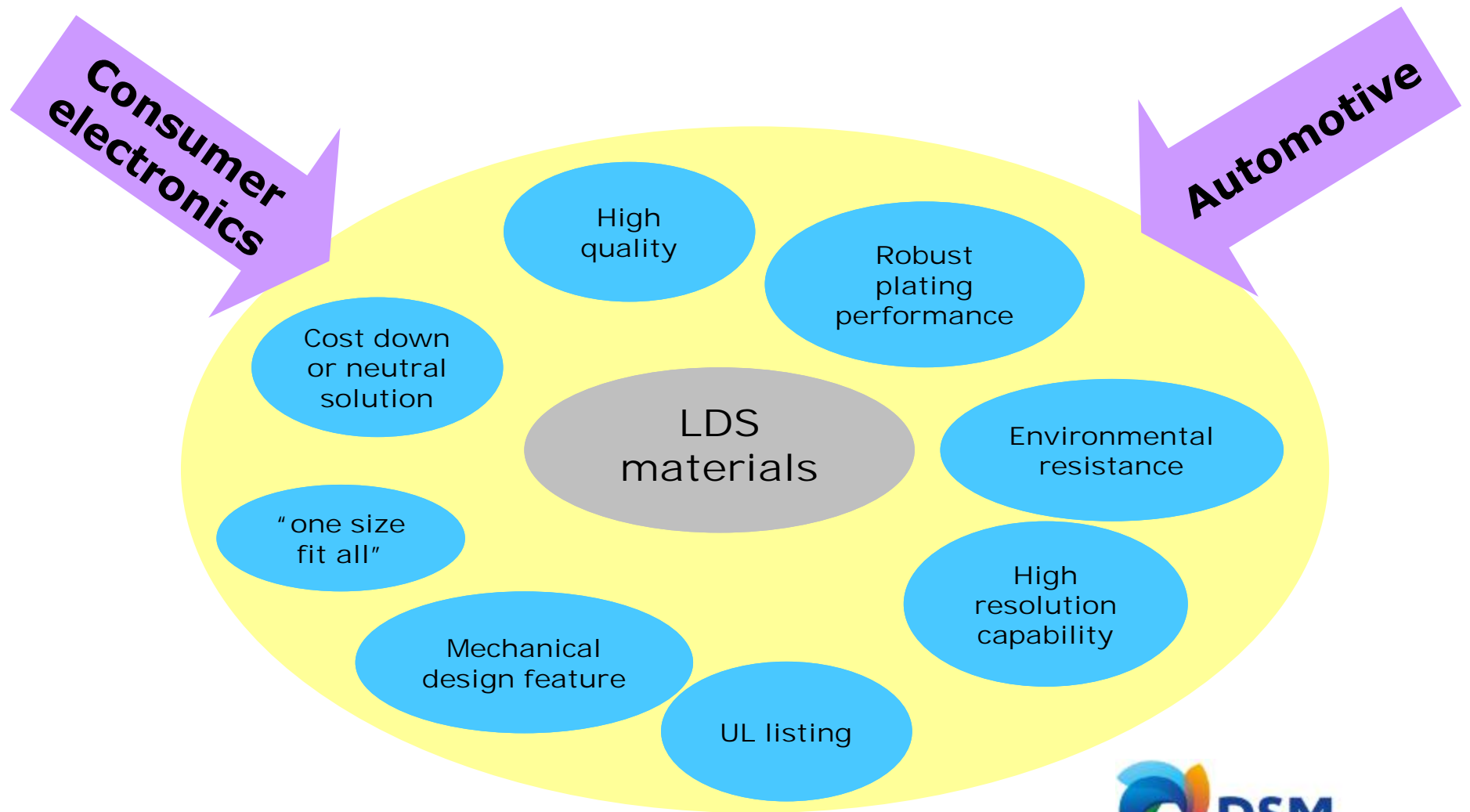
- Miniaturization and “thinnovation” demand for increased integration in consumer electronics
- Growing integration of electronics in automotive
- Increasing demand for Design freedom. ( Style & function)



All leading to the increase need for 3D MID technology



# LDS - proven technology in more demanding applications



# DSM ForTii LDS grades - basic performance

- DSM ForTii LDS material
  - SMT/reflow capable
  - JEDEC MSL1/2 capable
  - High impact resistance and ductility
  - Superior plating performance
  
- Available grade
  - LDS 51
    - V0 grade with optimal plating performance
  - LDS 81
    - HB grade with better mechanical property
  - LDS 85
    - HB grade with optimal impact resistance

Trade name	Stanyl ForTii	Stanyl ForTii	Stanyl ForTii
Color	Nat Blk	Nat Blk	Nat Blk
TM (GPa)	12	10.5	11.2
TS (MPa)	130	150	120
EaB (%)	1.2	2	1.6
Notched charpy (kJ/m <sup>2</sup> )	2	4.2	
UL94 performance bar 0.8 mm	HB	HB	V0
HDTA (1.8MPa) (°C)	300	285	290

Mechanical design feature

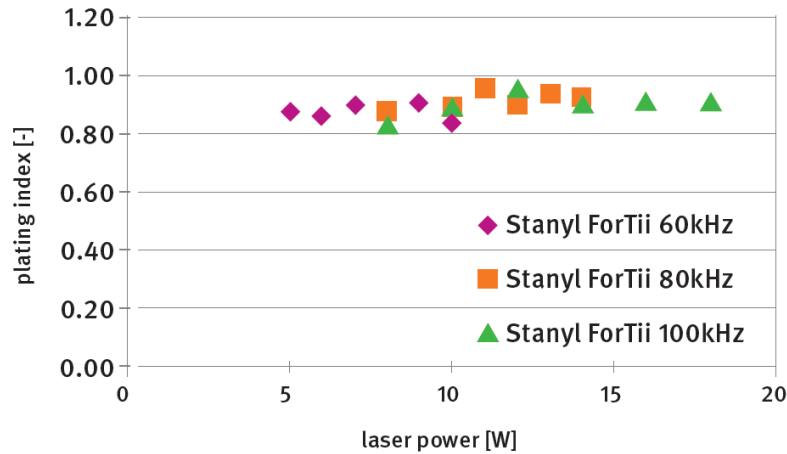
UL listing



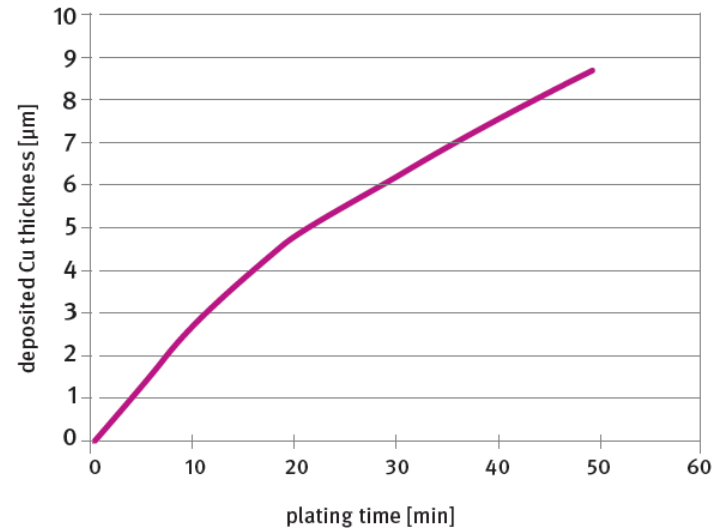
# DSM ForTii LDS grades

## - cost effective high performance solution for LDS

High plating index



Fast copper initiation



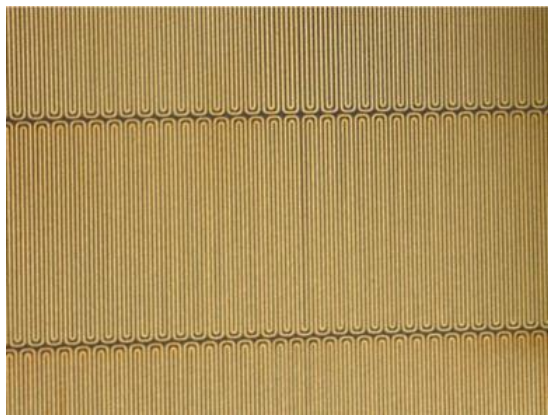
High quality

High resolution capability

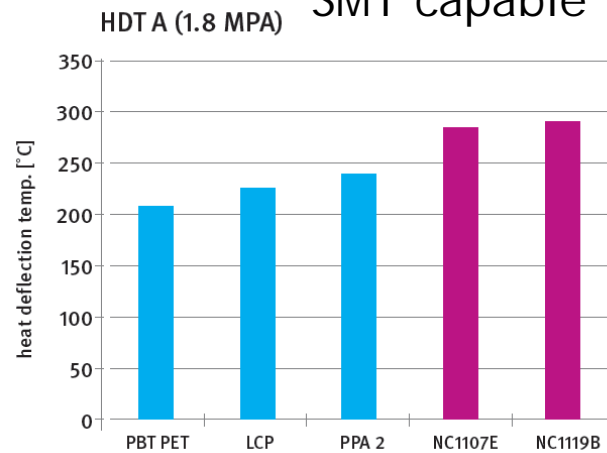
Cost down or neutral solution

"one size fit all"

High resolution - 100 micron



SMT capable



# New technologies

- Nano metal printing
- Key features:
  - Fully 3D possible, speed & print head decides on accuracy;
  - Via is already developed as printing possible (no need for radius)
  - Environmentally friendly (no more plating, no nickel use)
  - Cover layer about 5 micron, leading to serious reduction in paint cost
  - Further integration of functional components with structural supports is now fully open
  - Cost efficient



# Process in comparison with LDS

## Silver Printing

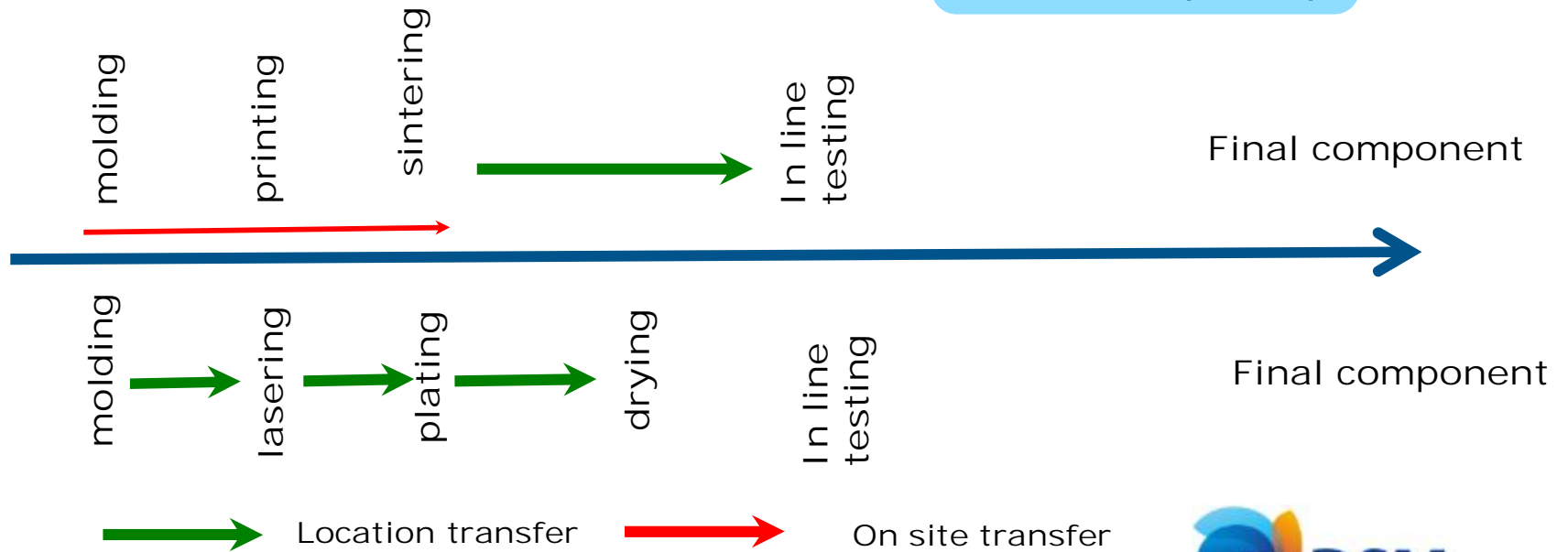
- Molding the regular plastic
- Printing the tracks
- Sintering the nano silver

## LDS

- Molding the LDS plastic
- Laser activation
- Plating process
- Cleaning & drying

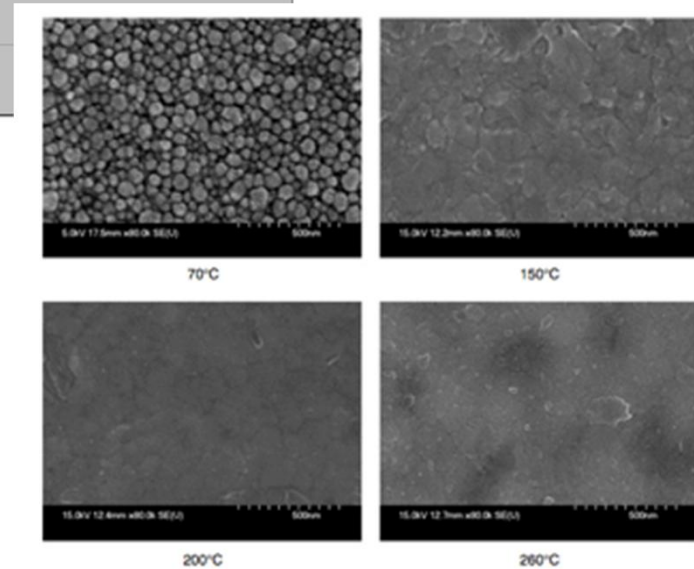
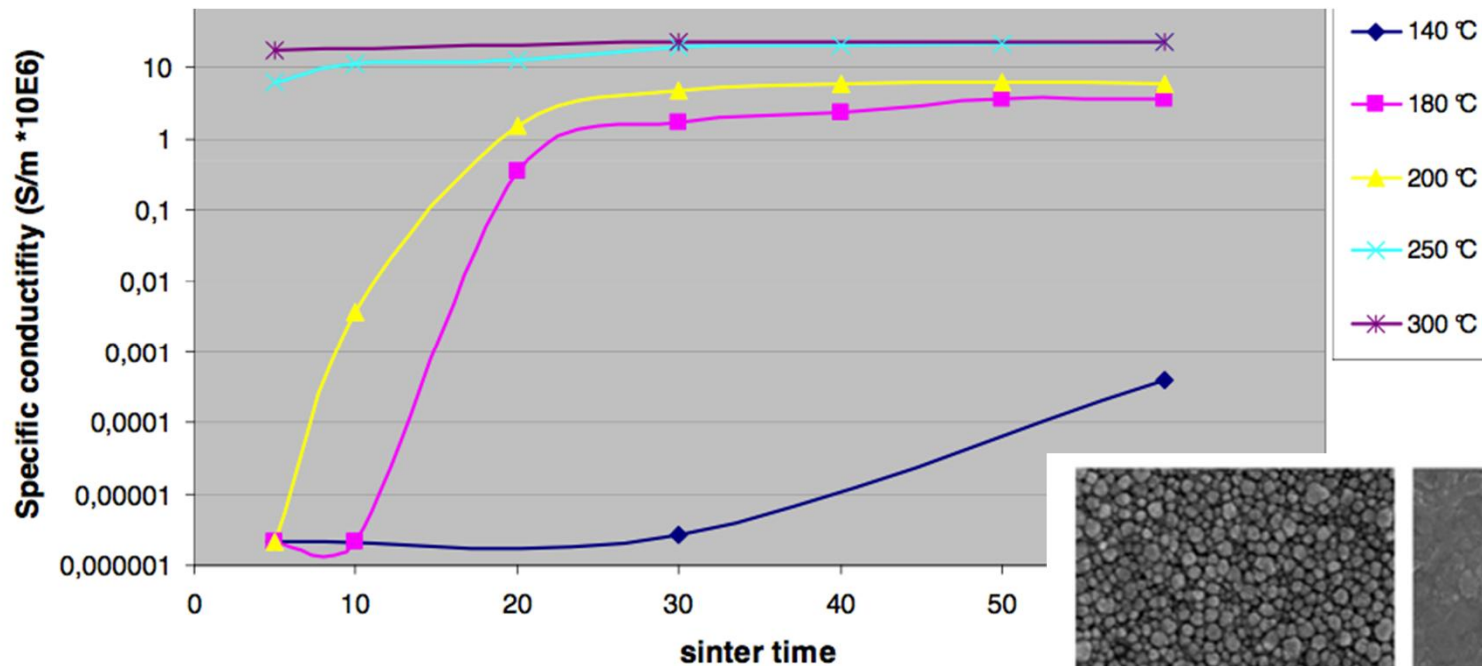
30 min sintering  
One shop stop

Multiple hours,  
multi shop stop





# Quality of the track



A solid silver structure will create a better conductor!

# Risks of metal migration



After 1000 hrs, in environmental chamber at 60C/95%RH @24V, there is no migration observed optically and electrically.

Missing of silver migration enables

- avoidance of expensive gold-platinum for the plating of electrical contacts
- no covering of the silver contacts with an inert coating (e.g. protective carbon layer and/or an overcoat dielectric)
- higher voltages between two contacts and/or shorter pitch sizes and hence smaller designs
- Best design flexibility (no sealing technology to avoid ambient penetration of moisture)

# DSM ForTii silver printing grade is commercial

- Designed for electronics integration in structural components
  - High impact resistance
  - High ductility
  - High stiffness
- Good adhesion with the paint, even after heat damp conditioning.
- Excellent moulding behaviour for complex designs

Property Data (Provisional)

**Stanyl® ForTii™**

**Stanyl® ForTii™ DSP82 (NC1125E)**  
**PA4T-GF40**  
 40% Glass Reinforced

Properties	Typical Data	Unit	Test Method
<b>Rheological properties</b>			
	dry / cond		
Molding shrinkage (parallel)	0.3/*	%	ISO 294-4
Molding shrinkage (normal)	0.9/*	%	ISO 294-4
<b>Mechanical properties</b>			
	dry / cond		
Tensile modulus	12500/-	MPa	ISO 527-1/-2
Stress at break	210/-	MPa	ISO 527-1/-2
Strain at break	2.7/-	%	ISO 527-1/-2
Flexural modulus	11000/-	MPa	ISO 178
Flexural strength	320/-	MPa	ISO 178
Charpy notched impact strength (+23°C)	13/-	kJ/m <sup>2</sup>	ISO 179/1eA
<b>Other properties</b>			
	dry / cond		
Density	1480/-	kg/m <sup>3</sup>	ISO 1183

# DSM approach in 3D MID

- Understanding of the industry and supply chain
- Strong partnerships
- Strong Application support & early involvement in projects
- Fast response to market





**BRIGHT SCIENCE. BRIGHTER LIVING.™**

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