



High Performance Metal Solutions

High Performance DynaMo™ Family of Sputtering Targets

H.C. Starck 

High Performance Metal Solutions

DynaMo™ Sputtering Target Material Properties

H.C. Starck Solutions offers flat rolled planar sputtering targets with the highest density in the industry.

DynaMo™ MECHANICAL PROPERTIES

Density (g/cc)	10
Tensile	
YTS 0.2% (MPa (ksi))	380 (55)
UTS (MPa (ksi))	560 (81)
% @ break	2
Hardness (HVN 5 Kg)	200
CTE (ppm/°C)	TBD
Conductivity	
Thermal (W/m²K)	210-250
Electrical (μΩ-cm)	6.4

TYPICAL MICROSTRUCTURES



Longitudinal



Transverse

DynaMo™ sputtering targets were introduced to market for mobile FPD and TSD applications as a barrier layer and capping layer.

Why Use H.C. Starck's DynaMo™?

DynaMo™ offers many benefits in etching and corrosion resistance.

> Etch Compatibility

- DynaMo™ has the closest Etch rate to aluminum (Al) in PAN etchant compared to all molybdenum (Mo) alloys available in market
- DynaMo™ can be easily etched with copper (Cu) etchant, producing clean profile with controlled taper angle

> Corrosion Resistance

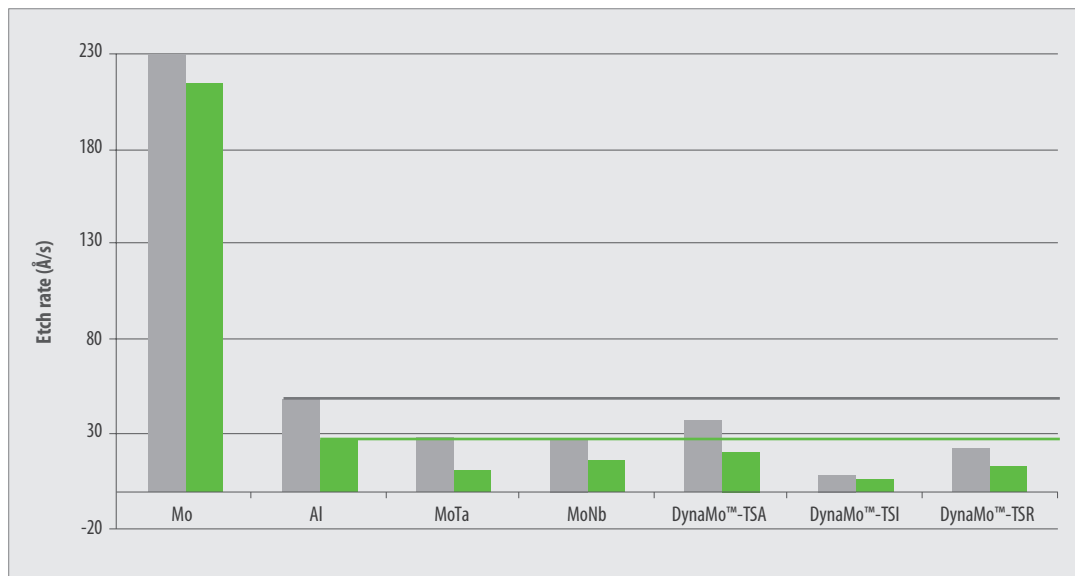
- DynaMo™ has 40-80% better Corrosion resistance in corrosive environments compared to molybdenum-niobium (MoNb) and molybdenum-tantalum (MoTa)

> Black Material

- DynaMo-Ox™ has Reflectivity less than 15%
- DynaMo-Ox™ is Etch compatible with Al

DynaMo™ offers the “BEST” Etching Solutions

ETCH RATE IN PAN ETCHANT



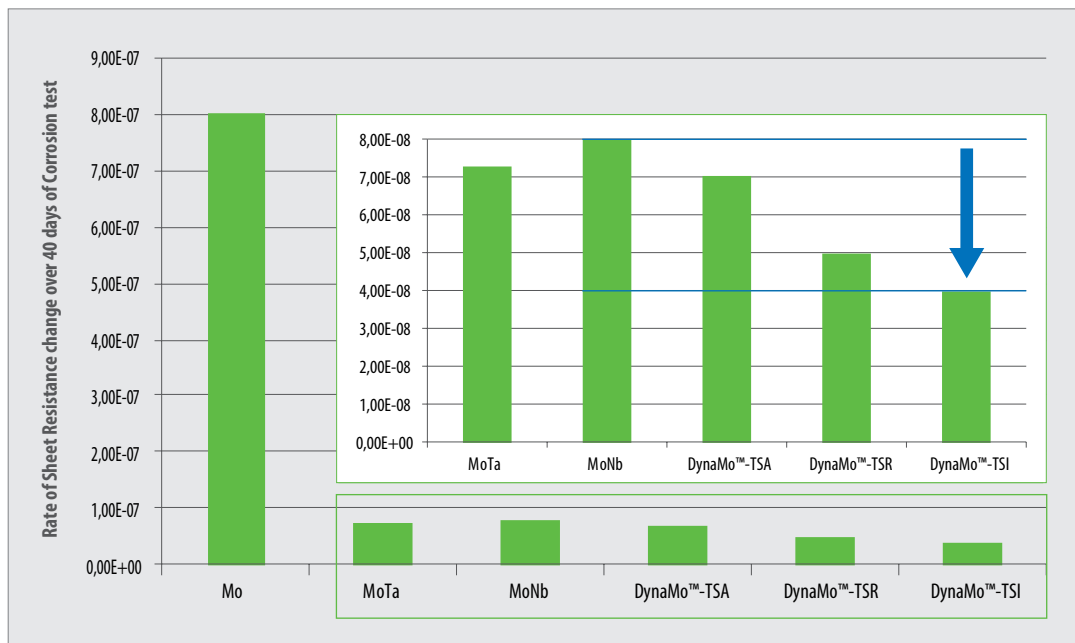
■ Temperature = 36 °C
 ■ Temperature = 42 °C

DynaMo-TSA™ etch rate in PAN etchant is the closest to Al at any given temperature.

DynaMo™ Anti-Corrosion Properties

Corrosion rate comparison of Mo alloy at 85 °C, 85%H

GLASS (100 nm Mo alloy)



DynaMo-TSI™ and DynaMo-TSR™ are specifically designed for Touch Sensor and Automotive Display applications. These materials perform 40-80% better in corrosive environments than MoNb and MoTa.

Black DynaMo™ for Anti-Reflective Coatings

The DynaMo™ family of sputtering targets can be employed to create Black Oxide for Anti-Reflective coatings.

H.C. Starck Solutions' patent pending solutions can be customized for each customer based on the customer's specific requirements and capabilities.

Solution 1 – Lower Reflection by engineering the grain size and surface morphology

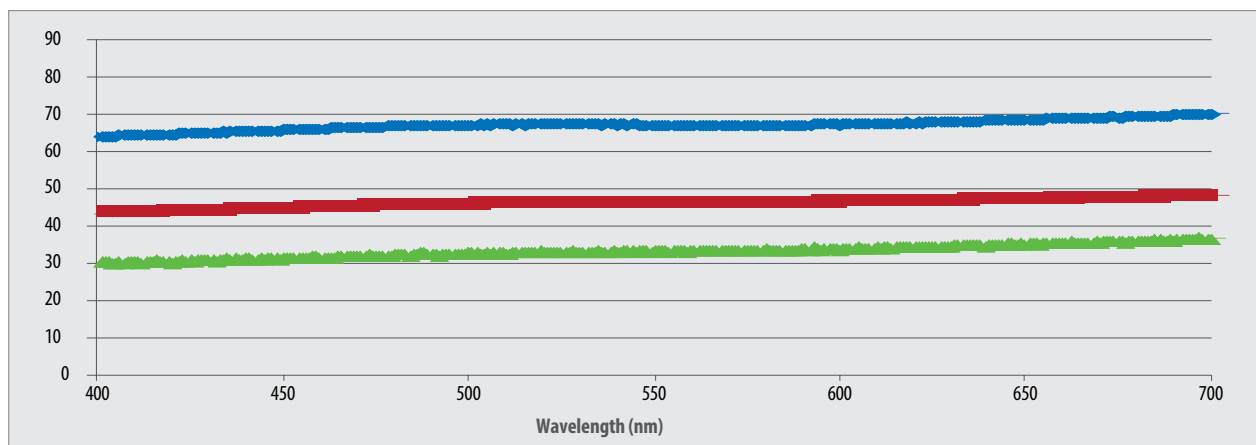
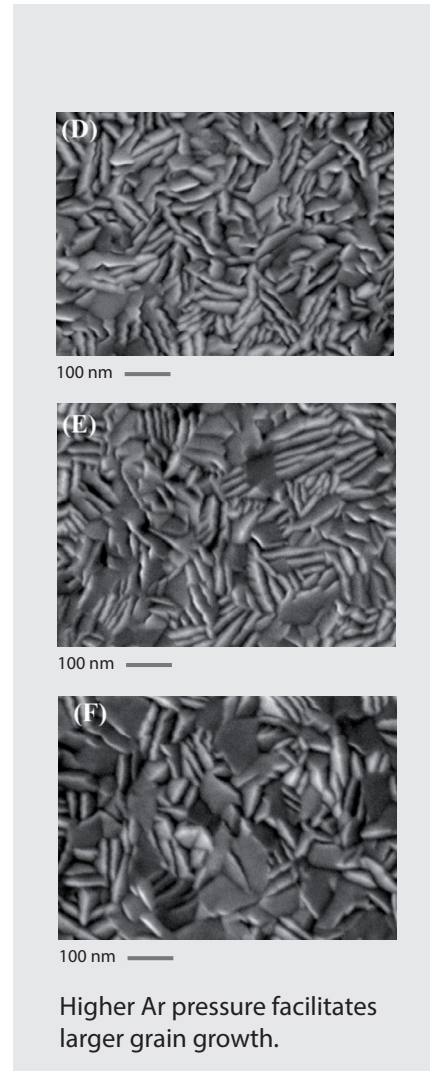
Advantages:

- > No need to change the sputtering target
- > No need to use reactive gasses during sputtering
- > Etch rate is not affected significantly
- > No need for high temperature post-processing

Disadvantages:

- > At 550 nm, Reflectivity will be about 40-60% depending on the deposition parameters.

H.C. Starck Solutions' includes a very unique composition of DynaMo™ that enables surface engineering of grain size and packing density, resulting to Reflection < 25-35%.



Solution 2 – Lower Reflectivity by Reactive Sputtering

Advantages:

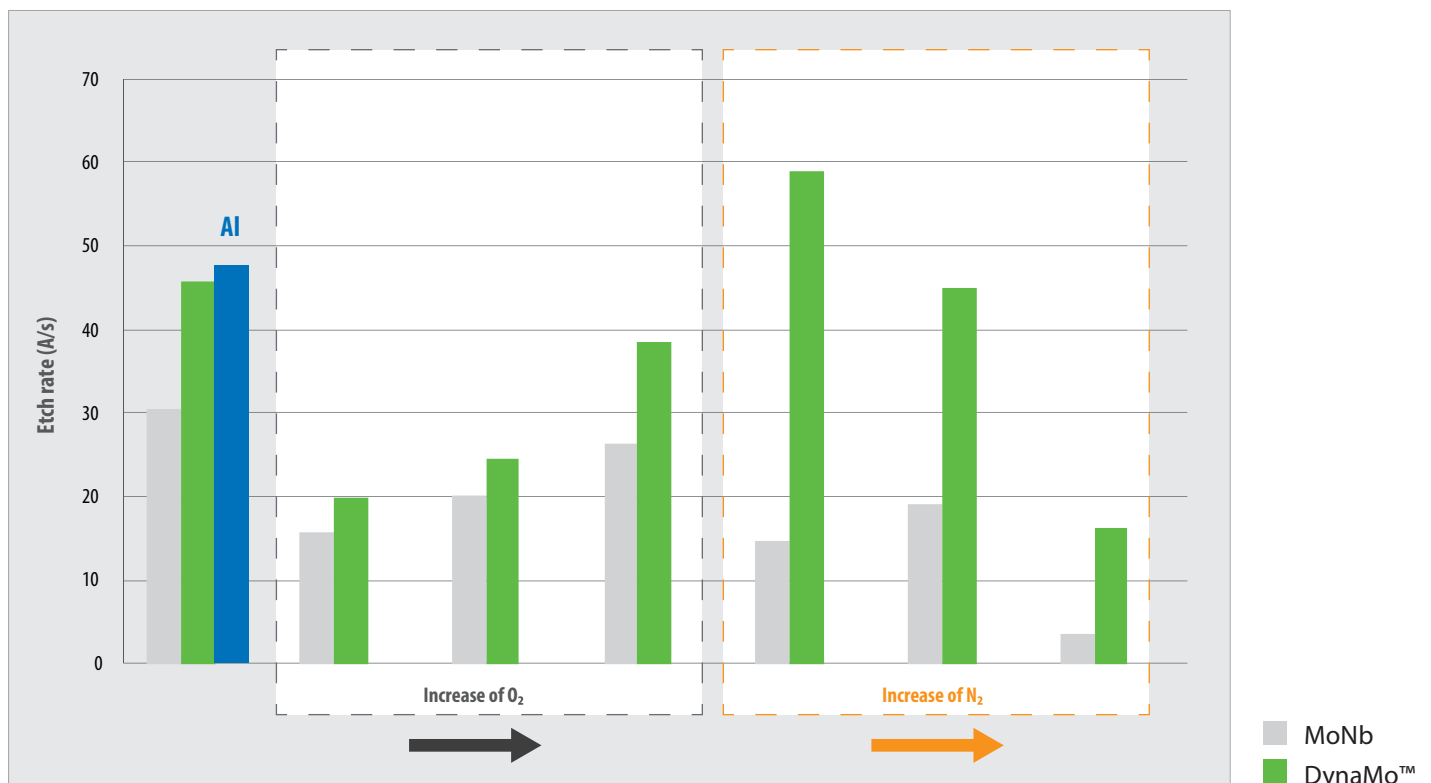
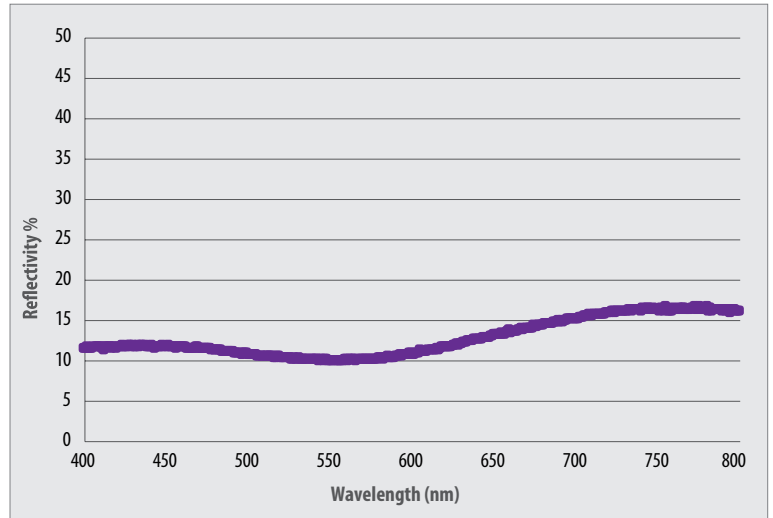
- > At 550 nm, Reflectivity < 10-15%
- > No need to change Target

Disadvantages:

- > Using Reactive gasses during sputtering

H.C. Starck Solutions’ patent pending DynaMo™ composition and its oxide are designed for etchant (e.g. PAN) compatibly to ensure that etch rate is not significantly affected regardless of metallic or oxide format.

GLASS (200 nm DynaMo-Ox™ and 50 nm DynaMo-Nx™)



Solution 3 – Post annealing in air at Temperature of 350 °C

Advantages:

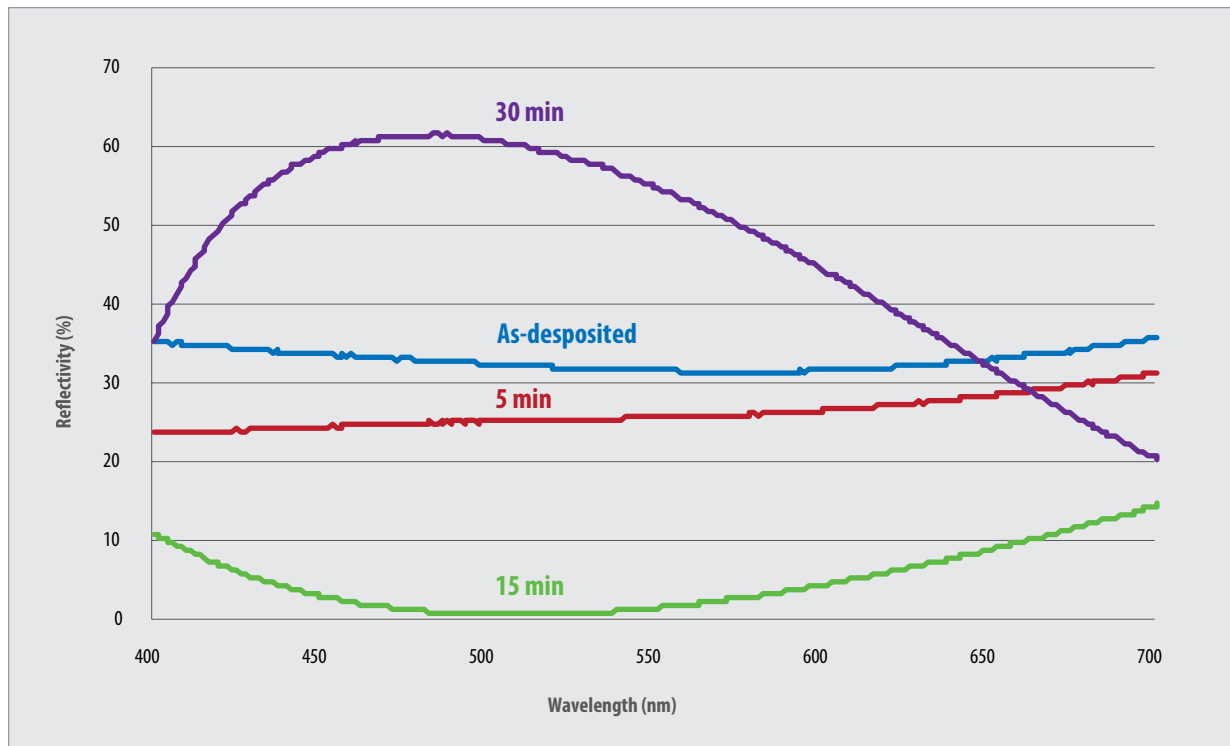
- > At 550 nm, Reflectivity < 0-10%
- > No need to change sputtering target
- > No need to use reactive gasses during sputtering
- > Etch rate is not affected significantly, since only the top surface is being affected

Disadvantages:

- > Post-process annealing step at high Temperature

H.C. Starck Solutions' includes an annealing process at the 350 °C, which is similar to the curing step in FPD-TSP production setting.

GLASS (30 nm DynaMo™, 3000 nm Al and 30 nm DynaMo™)



Solution 4 – Lowering Reflectivity by Surface Modification: Anodization

Advantages:

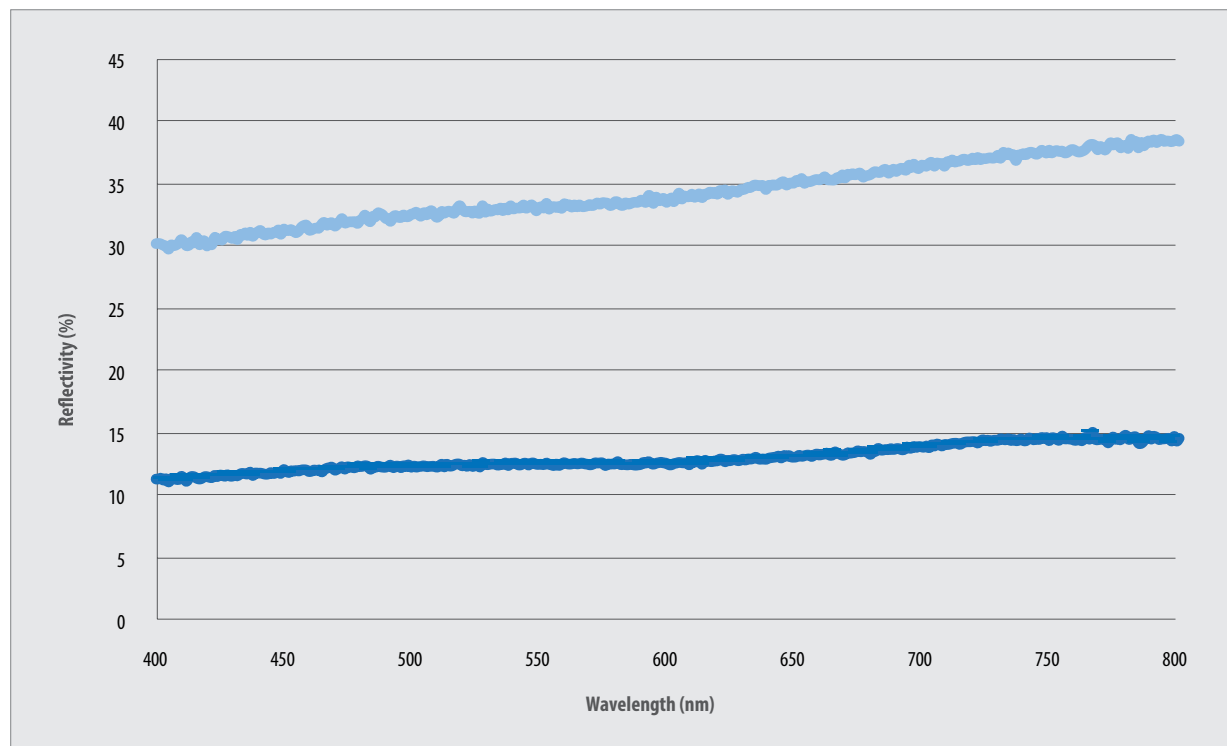
- > At 550 nm, Reflectivity < 10-15%
- > No need to change the sputtering target
- > No need to use reactive gasses during sputtering
- > Etch rate is not affected significantly, since only the top surface is being modified
- > Room temperature post-processing step

Disadvantages:

- > Only certain material/composition react to anodization process

H.C. Starck Solutions' includes its patent pending anodization process for the DynaMo™ family of products. DynaMo™ would easily anodize using a low concentration of acidic/basic solution.

GLASS (200 nm DynaMo™ and 3-5 nm Anodized DynaMo™)



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DPAP 03/2020

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