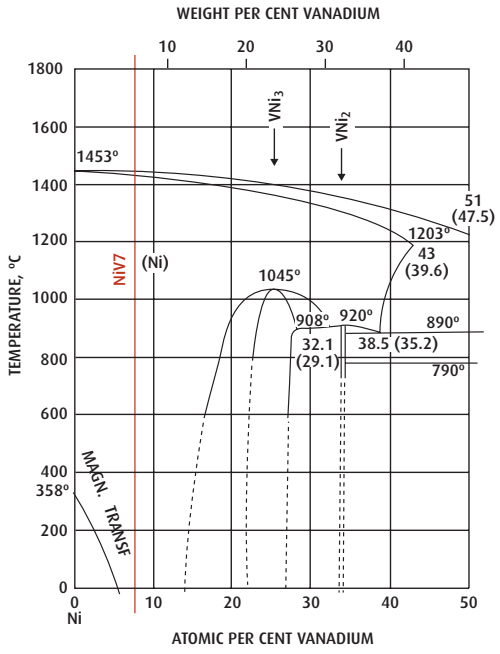
NiV7 for Semiconductor Applications

umicore

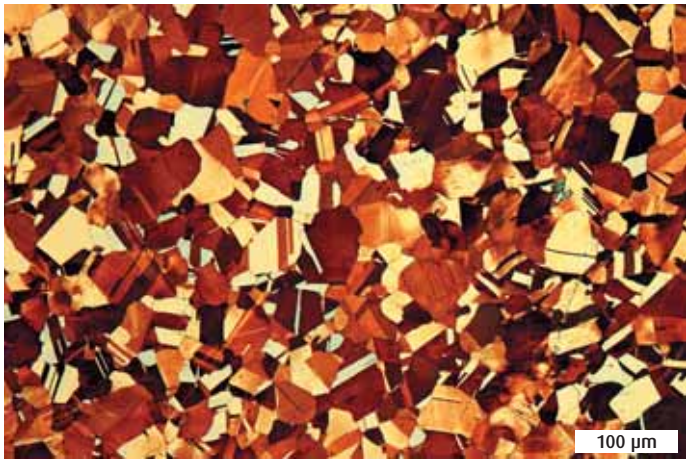
Umicore Thin Film Products

Umicore Thin Film Products, a globally active business unit within the Umicore Group, is one of the leading producers of coating materials for physical vapor deposition with more than 50 years experience in this field. Its Semiconductor portfolio covers a wide range of highly effective sputtering targets and evaporation materials.

Nickel plus 7 wt % Vanadium (NiV7) is an important thin film sputtering alloy in the field of Semiconductors. It features the desirable chemical, electrical and optical properties of pure Ni, with the added advantage to be not ferromagnetic. Due to the non ferromagnetic property, it is easy to use in high-rate magnetron sputtering equipment. NiV7 coatings applications include resistive films, diffusion barriers, and prewetting layers for advanced packaging, e.g. Flip-Chip technology.



Binary phase diagram for Ni-V



Microstructure of NiV7

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Production Process

Our NiV7 sputtering targets for Semiconductor applications are vacuum melt and cast. Special thermomechanical heat treatment processes guarantees a uniform structure optimized to the different target geometries.

Analysis

All materials are tested in our leading edge analytical laboratory or in one of our associate laboratories:

- Glow Discharge Mass Spectrometry (GDMS)
- X-ray Fluorescence Spectrometry (XRF)
- Hot Gas Extraction (LECO)
- Metallographic Investigation

Alloy Composition

Vanadium content is held at 7 +0.5/–0.3 wt%. The vanadium is 100% atomically solved within the nickel matrix. This guarantees non ferromagnetic properties and excellent sputtering performance.

Microstructur

Due to the optimized thermomechanical treatment steps our NiV7 alloy has a uniform, isotropic grain structure with a average grain size of 150 µm. The structure is free from inclusions and precipitations. A typical micrograph is shown on page 2.

Purity

Our NiV7 has a guaranteed metallic purity of 3N5.

Trace Impurities

A selection of maximum and the typical impurity values is listed below.

Metallic Element

Ag	5
Al	100
Ca	1
Co	75
Cr	45
Cu	15
Fe	75
K	1
Li	1
Mg	50
Mn	5
Mo	75
Na	1
Si	200
Ti	50

Non-metallic Element

C	20
N	50
O	200
S	5

All values are listed in ppm.

Dimensions

Due to our dynamic management processes, different dimensions (ø up to 400mm, length up to 800 mm) can be realized within a short period of time. Targets are available in monoblock or bonded versions.

Bonding

Umicore Thin Film Products uses its own proprietary bonding method, based on a flux-free solder technique. Thin film adhesion and diffusion barrier layers are applied to the back of each target, followed by a temperature controlled metallic solder seal between target and backing plate. The bonding is compliant to accommodate mechanical and thermal stress.

Packaging

Final cleaning and packaging is completed under clean room conditions. All targets are vacuum sealed in argon-filled polyethylene bags, guaranteeing consistent target performance, even when stored for a longer period of time.

Quality Assurance

Our quality assurance process is ISO 9001:2000 certified to guarantee the highest and most consistent product reliability. Documentation, traceability, statistical process control, detailed test and process specifications as well as sophisticated analytical methods and continuously trained employees are important elements of our quality assurance process.

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