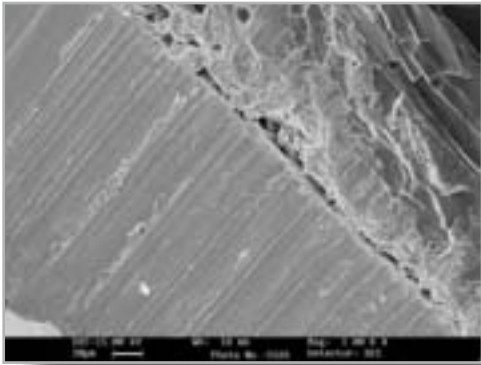




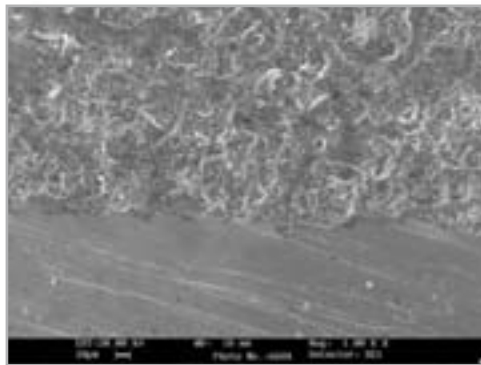
# NOBIL 4000

## CO-CR ALLOY FOR CERAMICS



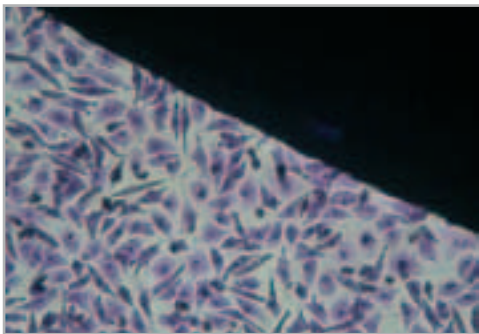
Ni - Cr Alloy

Negative interface, non-existent metal-ceramic bond



NOBIL 4000

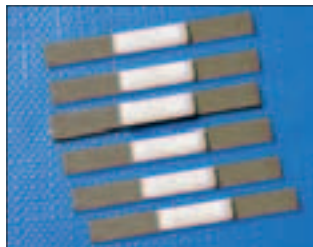
Interface between Nobil 4000 alloy/Ceramco 3 ceramic



Inverse optical microscope image of Nobil 4000 alloy. It is possible to make out the black outline of the alloy. The cells are of considerable density and grow until in direct contact with the alloy disc.



Dynamometer with accessory for carrying out the Schwickerath crack initiation test: a new method used to determine quantitatively the metal-ceramic bond strength.



Samples created for the Schwickerath crack initiation test\*

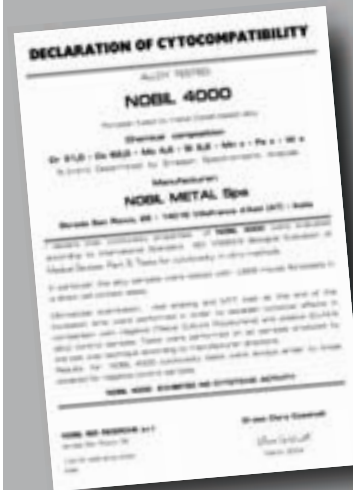
\*For further information, please request our abstract "Nobil Metal: from the planning stage to the patient" (Italian version only)

Based on experience gained with Nobil 3000, Nobil Metal has developed Nobil 4000, a cobalt-based white dental alloy for ceramics (Co-Cr). The chemical ingredients of this alloy have been determined using spectrophotometric analysis (emission spectrophotometer).

The high breaking potential value (Ep 499 mV) and low current density at 300 mV ( $I_{300} 0,42 \mu A \cdot cm^{-2}$ ) is proof of the excellent corrosion resistance of Nobil 4000.

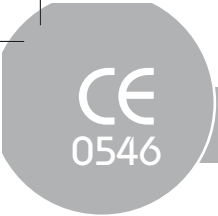
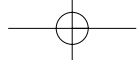
The tests carried out on this alloy confirm the maximum cytocompatibility (tests carried out in accordance with the protocols contained in standard EN ISO 10993-5: 1999, Biological Evaluation of Medical Devices – Part 5: Tests for in vitro cytotoxicity and in accordance with the International bibliography).

The cell behaviour proved to be similar to that recorded for pure gold. Nobil 4000 is nickel and beryllium free.



**NOBIL-METAL®**  
Alloys & Solders

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# NOBIL 4000

Read the relevant safety data sheet



The alloy Nobil 4000 can be used with all ceramics available on the market with the conventional thermal expansion coefficient.

### CHEMICAL COMPOSITION PERCENTAGE (M/N)

Co	Cr	Mo	Si	Mn	Fe	W
62,0%	31,0%	4,0%	2,2%	x	x	x

x = < 1,0%

### PHYSICAL AND MECHANICAL PROPERTIES

	White	
	g/cm <sup>3</sup>	
Color	White	
Density	g/cm <sup>3</sup>	8,6
Melting range	°C	1210-1370
Casting temperature	°C	1470
Thermal expansion coefficient (25-500 °C)	10 <sup>-6</sup> · K <sup>-1</sup>	14,4
Thermal expansion coefficient (25-600 °C)	10 <sup>-6</sup> · K <sup>-1</sup>	14,9
Modulus of elasticity	GPa	220
Yield strength	MPa	510-540
Elongation	%	12-7
Tensile strength	MPa	590-600
Vickers Hardness	HV 10/30	290-300

Reference standard: ISO 9693:1999

Recommended solders: PRE - Solder 1130 (1140 °C)



A.Gr. Dep. F195ENG: rev. 00-06/05

### CORROSION RESISTANCE

The electro-chemical properties have been tested in conformity with the procedures requested in ISO 10271:2001. The results obtained are as follows:

$$E_{ocp} = -0,201 \text{ mV}$$

$$E_p = 499 \text{ mV}$$

$$I_{300} = 0,42 \text{ } \mu\text{A}\cdot\text{cm}^{-2}$$

$$I_p = 9,93 \text{ } \mu\text{A}\cdot\text{cm}^{-2}$$

The high breaking potential value ( $E_p = 499 \text{ mV}$ ) and low current density at 300mV ( $I_{300} = 0,42 \text{ } \mu\text{A}\cdot\text{cm}^{-2}$ ) are proof of the excellent corrosion resistance of Nobil 4000.



### SPRUNG SYSTEMS: DIMENSION OF THE CASTING CHANNELS



Key: ● ø 4,5/5 mm ● ø 4mm

Among the various spruing systems, the method that guarantees repeatability whilst carrying out an operational protocol is the use of the distribution bar. It can be carried out easily by using preformed sprues. The peduncle should be positioned off-line as regards the casting channel. If the peduncle and casting channel are positioned on the same axis, the bar will have no function. The Nobil Metal STRATEGIC-LINE protocol contains all the technical instructions concerning spruing as regards the type of alloy used. In particular, for cobalt-based alloys or for low gold alloys, such as Nobil 4000, we recommend increasing the capacity section since the alloy's characteristics mentioned below is to have such a high fluidity to slow down its flow.

(Data taken from the Nobil Metal STRATEGIC-LINE protocol).

## NOBIL-METAL®

RECOMMENDS :



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for non precious metals



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non-precious, precious and  
latest generation ceramic alloys.

