

Corrosion Modeling Software and Corrosion Prediction Software Series

SIA-Compass®: A Software Tool for Modeling and Prediction of Corrosion of Surgical Implant Alloys in the Human Body

Protecting people, assets, and the environment from the harmful effect of corrosion

Version 13.5

★ Performance ★ Functionality ★ Usability



Anytime Anywhere Any Device Any OS
No USB dongles No installation No Browser Plug-ins

Contact Us for Licensing Details

Why WebCorr | Performance Guarantee | Unparalleled Functionality | Unmatched Usability | Any Device Any OS | Free Training & Support | CorrCompass

Overview of SIA-Compass: Software Tool for Modeling and Prediction of Corrosion of Surgical Implant Alloys in the Human Body

Surgical implant alloys are a group of biocompatible metals and alloys approved by the FDA for use in the human body to repair, replace, or augment tissues and structures. Corrosion of these metals and alloys in the human body has always been a concern as corrosion can lead to either the failure of the implant to function as it was intended, or have an adverse effect on the patient resulting in the rejection of the implant by the surrounding tissue, or both. Any surgical implant alloy is regarded as a foreign body, the safety and potential effect of foreign material on the human health cannot be ignored. Metal ions released as a result of corrosion are potentially toxic and carcinogenic. Based on the data by the International Agency for Research on Cancer (IARC), Cr(6+) and Ni(2+) are carcinogenic for humans (IARC Group 1), and metal Ni and dissolved Co are possibly carcinogenic (IARC Group 2B). Knowing the corrosion rate and the dominating form of corrosion for a candidate implant alloy will help healthcare providers to assess the potential risks to patients.

SIA-Compass is the only device and OS independent software tool on the market for the modeling and prediction of corrosion of surgical implant alloys. Healthcare providers and patients can quickly assess and

quantify the corrosion performance of the selected implant alloy anytime, anywhere, on any device running any OS without the need to install or download anything (Figure 1).

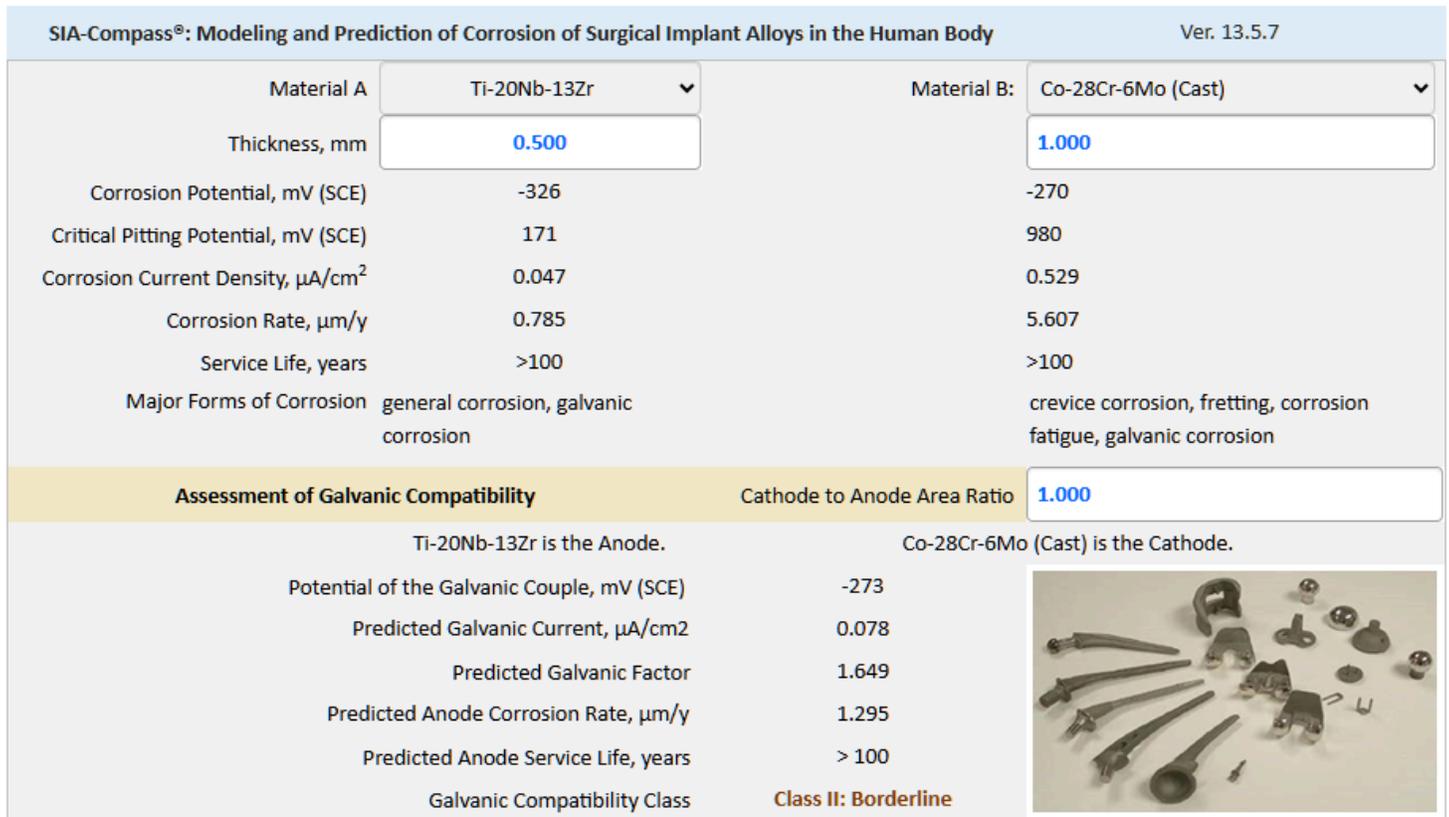


Figure 1 SIA-Compass Models and Predicts Corrosion of Surgical Implant Alloys.

SIA-Compass predicts the following corrosion properties for the selected implant alloy (Figure 1):

- (a) corrosion potential
- (b) critical pitting potential
- (c) corrosion current density
- (d) corrosion rate
- (e) major forms of corrosion

For galvanically coupled alloys, SIA-Compass models the effect of cathode-to-anode area ratio and predicts the galvanic compatibility of the selected alloys (Figure 1) with the following outputs:

- (a) potential of the galvanic couple
- (b) galvanic current density
- (c) galvanic acceleration factor
- (d) anode corrosion rate
- (e) remaining service life

(f) galvanic compatibility class

The implant alloys in SIA-Compass (Figure 2) include the following:

Type 316L

Co-28Cr-6Mo

Co-28Cr-6Mo (Cast)

Co-35Ni-20Cr-10Mo

Nitinol

cp-Ti

Ti-6Al-4V

Ti-5Al-2.5Fe

Ti-5Al-2Nb-1Ta

Ti-6Al-7Nb

Ti-6Al-7Nb (HA-coated)

Ti-13Nb-13Zr

Ti-20Nb-13Zr

Ti-15Zr-4Nb

Ti-10Mo-6Zr-4Sn-3Nb

AZ31

AZ61

Rx91 (Pd-38Ag-9Sn)

Super Star (Pd-28Ag-6In-5Sn)

W-1 (Pd-38Ag-9Sn)

Liberty (Pd-10Cu-6Sn-6Ga-2Au)

Freedom Plus (Pd-8Cu-6In-5Ga-2Au)

Legacy (Pd-10Ga-2Au-1Ag-1In)

Olympia (Au-39Pd-9In-2Ga)

Naturelle (Pd-15Cu-12Ga-1Au)

SIA-Compass®: Modeling and Prediction of Corrosion of Surgical Implant Alloys in the Human Body Ver. 13.5.7

Material A	Ti-20Nb-13Zr	Material B:	Co-28Cr-6Mo (Cast)
Thickness, mm	Type 316L		1.000
Corrosion Potential, mV (SCE)	Co-28Cr-6Mo		-270
Critical Pitting Potential, mV (SCE)	Co-28Cr-6Mo (Cast)		980
Corrosion Current Density, $\mu\text{A}/\text{cm}^2$	Co-35Ni-20Cr-10Mo		0.529
Corrosion Rate, $\mu\text{m}/\text{y}$	Nitinol		5.607
Service Life, years	cp-Ti		>100
Major Forms of Corrosion	Ti-6Al-4V		crevice corrosion, fretting, corrosion fatigue, galvanic corrosion
	Ti-5Al-2.5Fe		
	Ti-5Al-2Nb-1Ta		
	Ti-6Al-7Nb		
	Ti-6Al-7Nb (HA-coated)		
	Ti-13Nb-13Zr		
	Ti-20Nb-13Zr		
	Ti-15Zr-4Nb		
	Ti-10Mo-6Zr-4Sn-3Nb		
	AZ31		
	AZ61		
	Rx91 (Pd-38Ag-9Sn)		
	Super Star (Pd-28Ag-6In-5Sn)		
	W-1 (Pd-38Ag-9Sn)		

Assessment of Galvanic Corrosion	Cathode to Anode Area Ratio	1.000
Potential	Co-28Cr-6Mo (Cast) is the Cathode.	
Pre	-273	
Predic	0.078	
P	1.649	
	1.295	
	> 100	

Class II: Borderline



Corrosion Consulting Services

Figure 2 SIA-Compass Models and Predicts Corrosion of Surgical Implant Alloys.

If you cannot find the metal or alloy of your interest in the above list, do let us know through the [Contact Us link](#) and we will conduct the necessary research to generate the required data for inclusion in the software, free of charge for licensed users of SIA-Compass.

Click here to contact us for licensing details and experience the power of SIA-Compass.

SIA-Compass, giving you the right directions in Modeling and Prediction of Corrosion of Surgical Implant Alloys.