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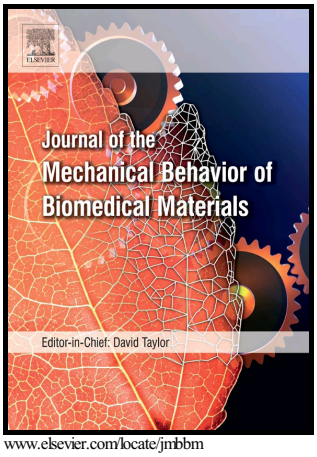

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Multifunctional zirconium nitride/copper multilayer coatings on medical grade 316L SS and titanium substrates for biomedical applications

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Abstract

Protecting from wear and corrosion of many medical devices in the biomedical field is an existing scientific challenge. Surface modification with multilayer ZrN/Cu coating was deposited on medical graded stainless steel (SS) and titanium substrates to enhance their surface properties. Structural results revealed that the ZrN/Cu coatings are highly crystalline and uniform microstructure on both the substrates. Dry and wet tribological measurements of the coated titanium substrate exhibit enhanced wear resistance and low friction coefficient due to the improved microstructure. Similarly, the corrosion resistance was exceptionally improved on titanium substrates, resulting from the high inertness of coating to the SBF electrolyte solution. Antibacterial activity and epifluorescence results signify the effective killing of pathogens by means of ion release killing as well as contact killing mechanisms.

Keywords: Multilayer, microstructure, wear resistance, corrosion resistance, antibacterial properties.