nanomaterials

MDPI

Supporting Information

Properties and Mechanism of Hydroxyapatite Coating Prepared by Electrodeposition on a Braid for Biodegradable Bone Scaffolds

Ting-Ting Li [1,2,3], Lei Ling [1], Mei-Chen Lin [4,5], Qian Jiang [1,2], Qi Lin [6], Jia-Horng Lin [1,3,4,5,7,8,9,*] and Ching-Wen Lou [3,7,8,10,11,*]

1 Innovation Platform of Intelligent and Energy-Saving Textiles, School of Textile Science and Engineering, Tianjin Polytechnic University, Tianjin 300387, China; tingtingli@tjpu.edu.cn (T.-T.L.); 1731015027@stu.tjpu.edu.cn (L.L.); jiangqian@tjpu.edu.cn (Q.J.)
2 Tianjin and Ministry of Education Key Laboratory for Advanced Textile Composite Materials, Tianjin Polytechnic University, Tianjin 300387, China
3 Fujian Key Laboratory of Novel Functional Fibers and Materials, Minjiang University, Fuzhou 350108, China
4 School of Chinese Medicine, China Medical University, Taichung 40402, Taiwan; ritalin2870@mail.fcu.edu.tw
5 Laboratory of Fiber Application and Manufacturing, Department of Fiber and Composite Materials, Feng Chia University, Taichung 40724, Taiwan
6 Fujian Engineering Research Center of New Chinese Lacquer Material, Minjiang University, Fuzhou 350108, China; linqi@mju.edu.cn
7 Ocean College, Minjiang University, Fuzhou 350108, China
8 College of Textile and Clothing, Qingdao University, Shandong 266071, China
9 Department of Fashion Design, Asia University, Taichung 41354, Taiwan
10 Department of Bioinformatics and Medical Engineering, Asia University, Taichung 41354, Taiwan
11 Department of Medical Research, China Medical University Hospital, China Medical University, Taichung 40402, Taiwan
* Correspondence: jhlin@fcu.edu.tw (J.-H.L.); cwlou@asia.edu.tw (C.-W.L.); Tel.: +886-424-518-661 (J.-H.L.

nanomaterials

MDPI

Table S1. The Ca/P ratio of HA coatings obtained by electrodeposition in the past two years by other authors.

Substrate	Electrolyte	Current Density/Voltage	Temperature	Time	PH value	Ca/P Ratio*	Ref.
Ti disc	0.61 mM $NH_4H_2PO_4$ and 0.36 mM $Ca(NO_3)_2{\cdot}4H_2O$	potentiodynamic mode, from −1.4 V to 0 V, scanning rate 0.2 mV/s	50/75 °C	2 h	5	1.63	[S1]
Ti64 alloy	$Ca(NO_3)_2NH_4H_2PO_4$ Electrolyte resistivity was 18 MΩ·cm at 25 °C	potentiodynamic mode, from −1.4 V to 0 V, scanning rate 0.2 mV/s	75 ± 0.5 °C	2 h	5/6	1.51	[S2]
Ti	0.008 M $Ca(NO_3)_2{\cdot}4H_2O$, 0.005 M $NH_4H_2PO_4$, 1 M $NaNO_3$ and 6 mL/L H_2O_2	15 mA/cm^2	65 ± 2 °C	---	6	1.64	[S3]
Carbon fibers	3.80×10^{-4} M $NH_4H_2PO_4$, 6.35×10^{-4} M $Ca(NO_3)_2$ and 0.1mol/L $NaNO_3$	1.0, 3.0, 5.0, 7.0 and 9.0 mA	98.4 °C	60,120,180 mins	6	1.57	[S4]
Nitinol alloy	0.042 M $Ca(NO_3)_2$, 0.025 M $(NH_4)_2HPO_4$, 6 mL/L H_2O_2/0.008 M $Ca(NO_3)_2$, 0.0005 M $(NH_4)_2HPO_4$, 6 mL/L H_2O_2	1.5、3、5 mA/cm^2, 1.5、5、15 mA/cm^2	70 ± 1°C	25 min	6	1.70	[S5]
Titanium plate	0.0006 M $Ca(NO_3)_2$, 0.00036 M $(NH_4)_2HPO_4$, 0.1 M $NaNO_3$/ 0.025 M $Ca(NO_3)_2$, 0.015 M $(NH_4)_2HPO_4$ 0.1 M $NaNO_3$	1 mA/cm^2	100 °C	2 h	6	1.67	[S6]

* The Ca/P ratio shown in the table is the best value obtained in the article.

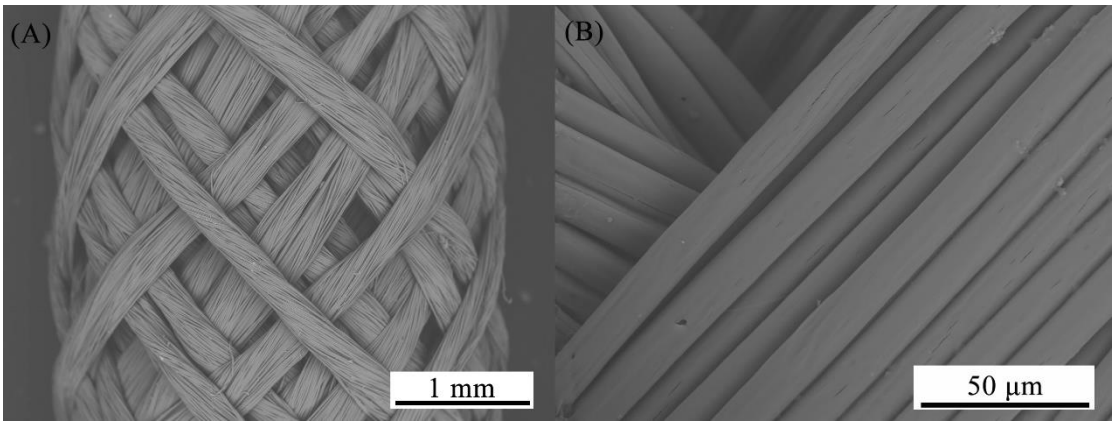

Figure S1. Surface morphology of undeposited braids, (**A**) SEM image of ×40 magnifications (**B**) SEM image of ×1000 magnifications.

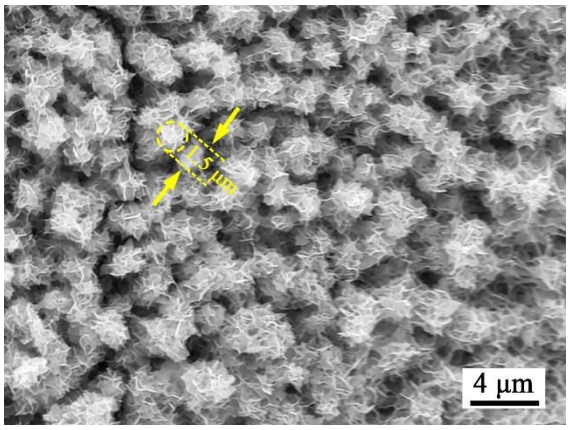

Figure S2. HA Crystal Diameter at 60 min Electrodeposition.

References

[S1] Cotrut, C.M.; Vladescu, A.; Dinu, M.; Vranceanu, D.M. Influence of deposition temperature on the properties of hydroxyapatite obtained by electrochemical assisted deposition. *Ceramics International* **2017**, *44*, 669–677

[S2] Vladescu, A.; Vranceanu, D.M.; Kulesza, S.; Ivanov, A.N.; Bramowicz, M.; Fedonnikov, A.S.; Braic, M.; Norkin, I.A.; Koptyug, A.; Kurtukova, M.O.; et al. Influence of the electrolyte's pH on the properties of electrochemically deposited hydroxyapatite coating on additively manufactured Ti64 alloy. *Scientific Reports* **2017**, *7*, 16819.

[S3] Fathyunes, L.; Khalil-Allafi, J. Effect of employing ultrasonic waves during pulse electrochemical deposition on the characteristics and biocompatibility of calcium phosphate coatings. *Ultrasonics Sonochemistry*. **2018**, *42*, 293–302.

[S4] Liu, Q.; Zhang, C.; Bao, Y.; Dai, G. Carbon fibers with a nano-hydroxyapatite coating as an excellent biofilm support for bioreactors. *Applied Surface Science* **2018**, *443*, 255–265.

[S5] Marashi-Najafi, F.; Khalil-Allafi, J.; Etminanfar, M.R. Biocompatibility of hydroxyapatite coatings deposited by pulse electrodeposition technique on the Nitinol superelastic alloy. *Materials Science and Engineering: C* **2017**, *76*, 278–286.

[S6] Pang, S.M.; He, Y.; He, P.; Luo, X.S; Guo, Z.Z.; Li, H. Fabrication of two distinct hydroxyapatite coatings and their effects on MC3T3-E1 cell behavior. *Colloids and Surfaces B-Biointerfaces* **2018**, *171* 40–48.