

Supporting information

Characterization of tannic acid coated AZ31 and AZ91 Mg alloys for biomedical applications

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AZ91 samples

The morphology at the macroscale of the casted samples of AZ91 is shown in Figure S1.

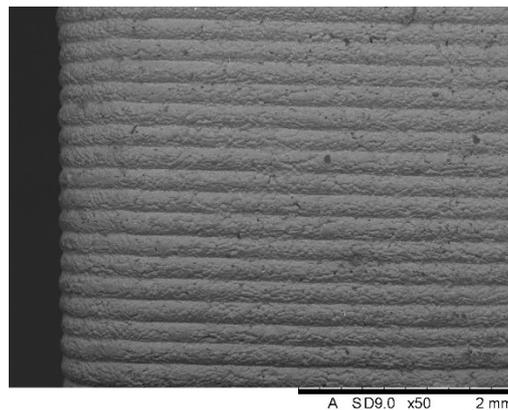


Figure S1: Optical picture of the AZ91 sample surface.

AZ31 tannic acid coating characterization

The results obtained by EDS on AZ31 samples before and after coating with the two different TA solutions are reported in **Table S1**.

Table S1: Surface composition by EDS of AZ31 samples as received and after coating with TA solution at different concentrations.

	Elemental composition (at%)			
	C	O	Mg	Al
AZ31	7.8	36.1	54.5	1.6
AZ31TA_5	37.3	48.2	14	0.5
AZ31TA_20	35.6	47.1	16.7	0.6

Degradation studies

The chemical composition of the different AZ31 samples after degradation up to 14 d in PBS, evaluated by EDS, are reported in Table S2.

Table S2: Surface composition by EDS of AZ31, AZ31TA_5, and AZ31TA_20 after soaking in PBS solution for different time points.

	Time (day)	Elemental composition (at%)					
		C	O	Na	Mg	Al	P
AZ31	1	4.9	54.9	1.6	33.2	1.4	4.0
	2	12.3	52.2	2.4	28.0	1.4	3.0
	7	1.0	67.6	2.1	20.4	0.2	8.6
	14	7.5	65.7	3.4	12.6	0.5	10.0
AZ31TA_5	1	7.7	52.0	1.3	34.4	N.D.	4.6
	2	6.1	63.3	2.3	21.9	0.4	5.9
	7	2.5	70.5	3.4	14.0	0.0	9.2
	14	N.D.	77.9	0.5	13.6	0.3	7.7
AZ31TA_20	1	3.5	61.2	2.7	23.6	1.1	7.9
	2	11.1	59.9	2.2	19.6	0.5	6.8
	7	4.2	68.7	2.4	15.5	0.7	8.4
	14	12.3	64.2	2.8	12.4	0.7	7.7

XPS peak deconvolution

The composition of the C1s, O1s and Mg1s peaks obtained by deconvolution are reported in Table S3, Table S4, and Table S5, respectively.

Table S3: Composition of the C1s peak (at%).

C1s	CC	CO ₃	CO	arC	COO	π - π /C-Mg
AZ31	71.48	13.57	14.94			
AZ31TA	40.63	5.17	39.63	5.38	6.45	2.74
AZ91	62.84	3.60	16.17		10.35	7.03
AZ91TA	35.89	0.92	31.05	15.19	13.89	3.07

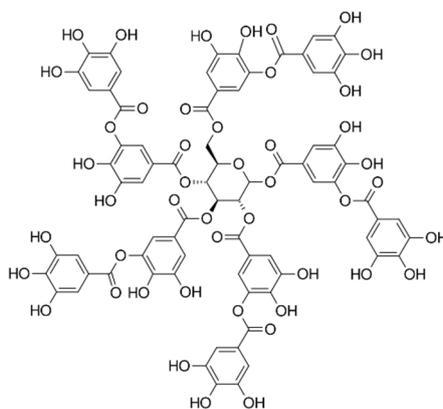
**Figure S2:** Tannic acid formula.

Table S4: Composition of the O1s peak (at%).

O1s	Mg(OH) ₂ /CO ₃	H ₂ O	arOH	MgO	COO
AZ31	67.4	7.0		25.6	
AZ31TA	15.8		32.0	35.5	14.7
AZ91	52.9	7.3		39.8	
AZ91TA	4.1		36.8	38.8	22.3

Table S5: Composition of the Mg1s peak (at%).

Mg1s	MgO	MgCO ₃	Mg(OH) ₂
AZ31	44.90	36.14	18.96
AZ31TA	55.55	30.06	14.39
AZ91	39.50	31.50	29.01
AZ91TA	55.22	43.34	1.44