Supplementary Information

Microstructural characterization and film-forming mechanism of phosphate chemical conversion ceramic coating prepared on the surface of 2A12 aluminum alloy

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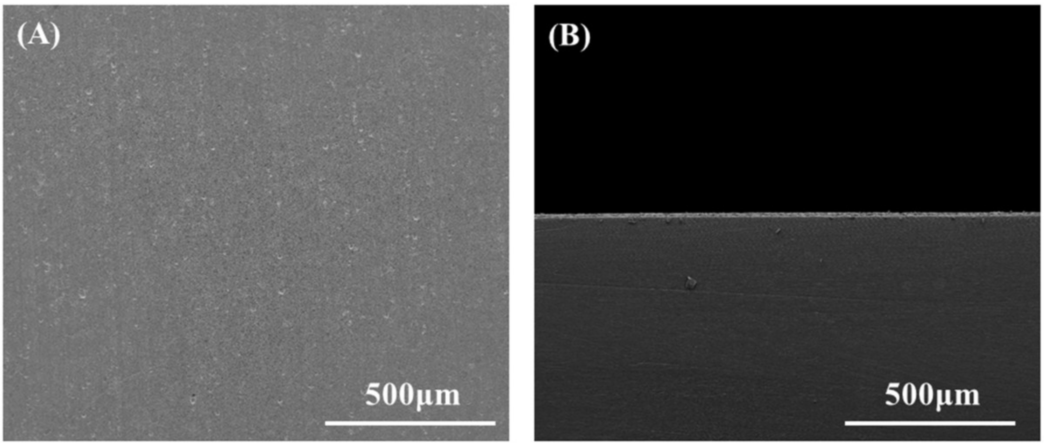

Fig. S1. Surface morphology (A) and cross-section morphology (B) of PCC ceramic coatings on the surface of 2A12 Al alloys.

Table S1 Weight loss of different types of coating

Coating	weight loss / %	Reference
Phytic acid conversion coating	>30	[1]
Phosphate conversion coatings	~40	[2]
Calcium phosphate coatings	~50	[3]
Epoxy coating	>50	[4]
Polyurethane coatings	~80	[5]
Polymeric coatings	>80	[6]
Phosphate conversion coatings	28	**This work**

The references cited above:

[1] R. Y. Zhang, S. Cai, G. H. Xu, *Appl. Surf. Sci.* 2014, **313**, 896-904.

[2] L. P. Wu, L. Zhao, J. H. Dong, *Electrochim. Acta*, 2014, **145**, 71-80.

[3] A. Roy, S. S. Singh, M. K. Datta, *Mater. Sci. Eng. B* 2011, **176**, 1679-1689.

[4] M. Buˇcko, V. Miˇskovi´c-Stankovi´c, *J. Rogan, Prog. Org. Coat.* 2015, **79**, 8-16.

[5] C. K. Patil, H. D. Jirimali, M. S. Mahajan, *React. Funct. Polym.* 2019, **139**, 142-152.

[6] C. H. Liu, T. C. Li, J. H. Zhang, *Prog. Org. Coat.* 2016, **90**, 21-27.

Table S2 Critical load (L_C) of different types of coating

Types	L_C / N	Reference
Zinc Phosphate Conversion Coating	46	[50]
Phosphate chemical conversion coating	50.7	[51]
Fluoride-phosphate conversion coating	63.5	[52]
PCC ceramic coating	178.55	**This work**

The references cited above:

[50] X. L. Shi, H. M. Zhu, A. Valanezhad, *Phys. Status Solidi A*, 2018, **215**, 1800143 (1-7).

[51] C. C. Jiang, G. Y Xiao, X. Zhang, *New J. Chem.*, 2016, **40**, 1347-1353.

[52] S. X. Wang, X. H Liu, L. Q. Wang, *RSC Adv.*, 2017, **7**, 16078-16086.

Table S3 Corrosion current density (I_{corr}), corrosion potential (E_{corr}) and corrosion inhibition efficiency (η) obtained from potentiodynamic polarization curves.

Sample	I_{corr} (A/cm^2)	E_{corr} (V)	η
2A12 Al substrate	1.603×10^{-4}	-1.264	-
PCC ceramic coating	1.382×10^{-7}	-1.099	99.91%