

Supplementary Materials: Analysis of Different Complex Multilayer PACVD Coatings on Nanostructured WC-Co Cemented Carbide

Danko Čorić ¹, Mateja Šnajdar Musa ^{2,*}, Matija Sakoman ¹, and Željko Alar ¹

¹ Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, Ivana Lučića 5, 10000 Zagreb, Croatia; danko.coric@fsb.hr (D.Č.); matija.sakoman@fsb.hr (M.S.); zeljko.alar@fsb.hr (Ž.A.)

² Department of Polytechnics, University of Rijeka, Sveučilišna Avenija 4, 51000 Rijeka, Croatia

* Correspondence: mateja.snajdar@uniri.hr

Table S1. Sample polishing parameters.

Step	Diamond Paste, μm	Speed of Rotation, rpm	Force, N	Time, min.
1	9	150	210	5
2	6	150	210	10
3	3	150	150	8

Citation: Čorić, D.; Musa, M.Š.; Sakoman, M.; Alar, Ž. Analysis of Different Complex Multilayer PACVD Coatings on Nanostructured WC-Co Cemented Carbide. *Coatings* **2021**, *11*, 823. <https://doi.org/10.3390/coatings11070823>

Academic Editors: Marek Szindler

Received: 28 May 2021

Accepted: 4 July 2021

Published: 8 July 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

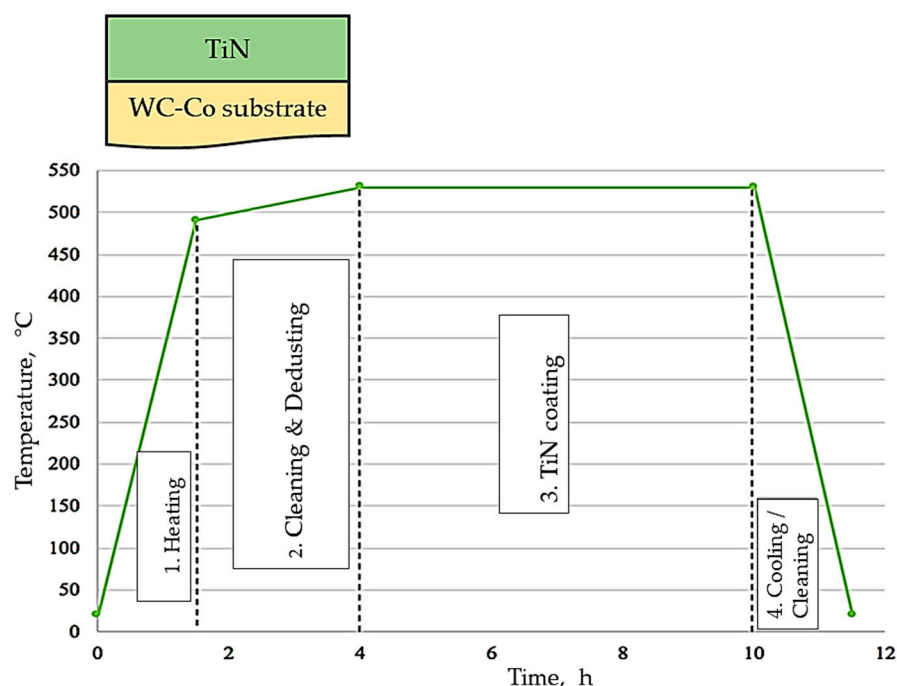


Figure S1. TiN coating process scheme.



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Table S2. TiN coating process parameters.

Process Stage	1 Heating	2 Cleaning	3 TiN Coating	4 Cooling/Cleaning
Duration, h	1.5	2.5	6	1.5
Pressure, mbar	2	2	2	2
Temperature, °C	20–490	490–530	530	530–20
Flow H ₂ , L/h	140	140	140	100
Flow Ar, L/h	0	10	10	0
Flow TiCl ₄ , L/h	0	0	3,6	0
Flow N ₂ , L/h	0	23	15	0
N ₂ pulse	-	-	12s/12s	-
Voltage, V	0	540	490	0
Plasma power, W	0	900–1800	2200	0

Table S3. TiCN coating process parameters.

Process stage	1 Heating	2 Cleaning	3 TiN	4 TiN	4 TiN–TiCN Alterations	5 TiCN	5 TiN	6 TiCN	7 Cooling/Cleaning
Duration	1.5 h	2.5 h	1 h	750 s	500 s 20 x	500 s	1000 s	1000 s	1.5 h
Pressure, mbar	2	2	2	2	2	2	2	2	2
Temperature, °C	20–490	490–530	530	530	530	530	530	530	530–20
Flow H ₂ , L/h	140	140	140	140	140	140	140	140	100
Flow Ar, L/h	0	10	10	10	10	10	10	10	0
Flow CH ₄ , L/h	0	0	0	0	4,5	4,5	0	4,5	0
Flow TiCl ₄ , L/h	0	0	3	3	3	3	3	3	0
Flow N ₂ , L/h	0	23	15	15	13	15	15	15	0
N ₂ pulse	-	-	-	12s/12s	12s/12s	12s/12s	-	12s/12s	-
Voltage, V	0	520–540	490	490	490	490	490	490	0
Plasma power, W	0	900–1800	1650	1950	1950	1950	1650	1950	0

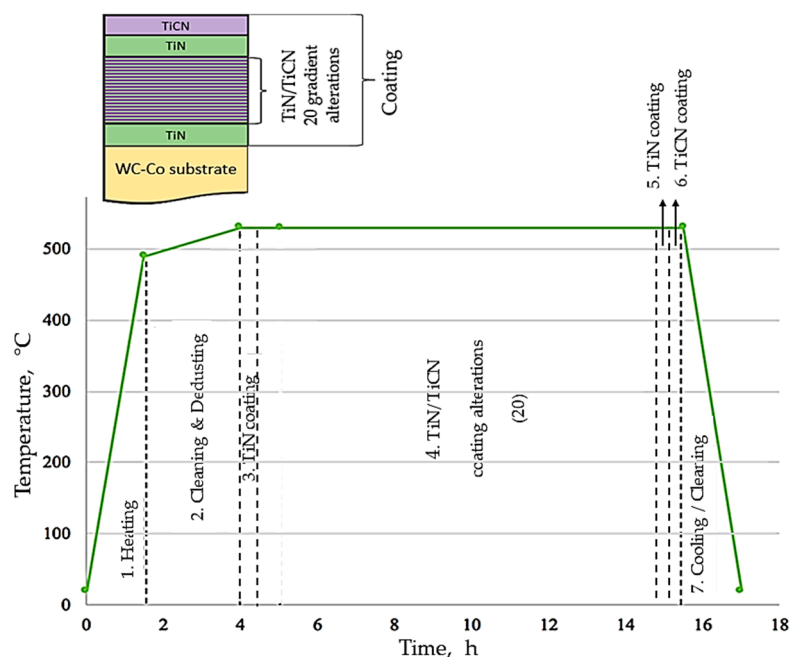
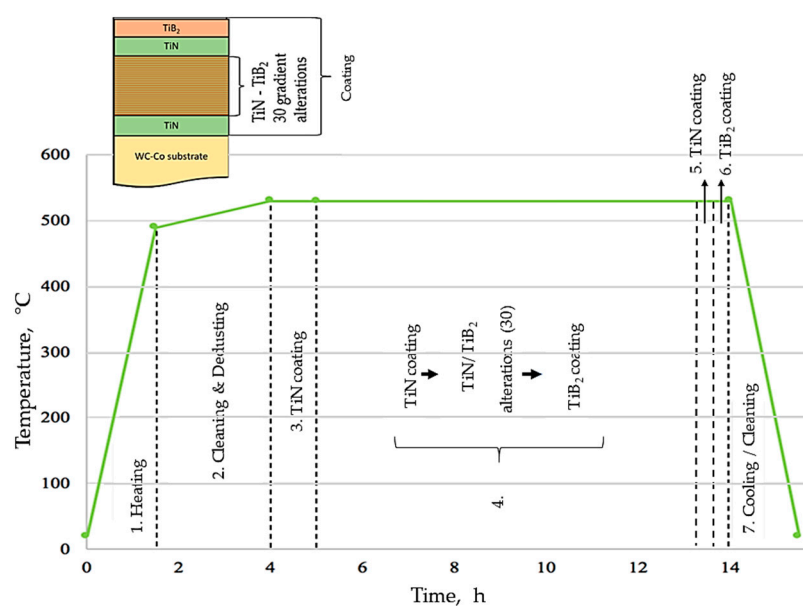
**Figure S2.** TiCN coating process scheme.

Table S4. TiBN coating process parameters [1].

Process stage	1 Heating	2 Cleaning	3 TiN	4 TiN/TiB ₂ transition	5 TiN	6 TiB ₂	7 Cooling/Cleaning
Duration	1.5 h	2.5 h	1 h	500 s	250 s	1200 s	1200 s
Prepressure, mbar	2	2	2	2	2	2	2
Temperature, °C	20–490	490–530	530	530	530	530	530–20
Flow H ₂ , L/h	140	140	140	140	140	140	100
Flow Ar, L/h	0	10	10	7	10	7	0
Flow CH ₄ , L/h	0	0	0	4,5	0	0	0
Flow TiCl ₄ , L/h	0	0	3	3	3	3	0
Flow N ₂ , L/h	0	23	15	15	15→0	0	0
Flow BCl ₃ , L/h	0	0	0	0	0→9	9	0
Voltage, V	0	520–540	490	490	560	560	0
Plasma power, W	0	900–1800	1650	1650	1650	1650	0

**Figure S3.** TiBN coating process scheme.

References

1. Šnajdar Musa, M.; Sakoman, M.; Ćorić, D.; Fabijanić, T.A. Exploitation and wear properties of nanostructured WC-Co tool modified with plasma-assisted chemical vapor deposition TiBN coating. *Metals* **2021**, *11*, 333, doi:10.3390/met11020333.