**Supplementary Information**

**Insights into the oxidation resistance mechanism and tribological behaviors of multilayered TiSiN/CrV*x*N hard coatings**

*Hongbo Ju1*,3),🖂, *Moussa Athmani*2), *Jing Luan*3), *Abbas AL-Rjoub*3), *Albano Cavaleiro*3,4), *Talha Bin Yaqub*4), *Abdelouahad Chala*2), *Fabio Ferreira*3), and *Filipe Fernandes*3,5),🖂

1) School of Materials Science and Engineering, Jiangsu University of Science and Technology, Zhenjiang 212003, China

2) Laboratory of Physics of Thin Films and Applications, University of Mohamed Khider, BP 145 RP, Biskra 07000, Algeria

3) CEMMPRE, ARISE, Department of Mechanical Engineering, University of Coimbra, Coimbra 3030-788, Portugal

4) IPN - LED & MAT - Instituto Pedro Nunes, Laboratory of Tests, Wear and Materials, Coimbra 3030-199, Portugal

5) ISEP, Polytechnic of Porto, Rua Dr. António Bernardino de Almeida, Porto 4249-015, Portugal

🖂Corresponding authors: Hongbo Ju E-mail: hju@uc.pt; Filipe Fernandes E-mail: fid@isep.ipp.pt



**Fig. S1**. Elemental lines profiles along the cross-section of C0 oxidized at 900°C for 2 h.



**Fig. S2**. Elemental lines profiles along the cross-section of V-doped coatings oxidized at 900°C for 2 h: (a) C2, (b) C4, and (c) C8.



**Fig. S3**. Cross-section morphology of C8 oxidized at 700°C for 2 h.



**Fig. S4**. SEM cross-section and correspondent elemental maps of C8 film oxidized at 700°C.