Erratum to: Tribological Performance of Halogen-Free Ionic Liquids as Lubricants of Hard Coatings and Ceramics

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The original version of article unfortunately contained a mistake.

The presentation of Table 3 was incorrect. The correct Table 3 is given below.

The presentation of Fig. 2 was incorrect. The correct Fig. 2 is given below.

The presentation of Fig. 3 was incorrect. The correct Fig. 3 is given below.

Section 3.1 contained four missing sentences. The correct sentences are given below.

1. Second paragraph, L2 “On the other hand, the friction coefficient of Si_3N_4 lubricated with [EMIM] [DCN] was higher than that of SiC.”
2. Second paragraph, L5 “On the other hand, when [EMIM] [DCN] was used, a remarkable difference was

observed between the friction behaviors of Si_3N_4 and the others.”

3. Second paragraph, L6 “Though Si_3N_4 had the smoothest surface of all ceramics, its friction coefficient showed the highest value.”
4. Second paragraph, L8 “However, the friction coefficient of Si_3N_4 , which had the smoothest surface ($R_a = 0.020$), was higher than those of the others.”

Section 4 contained two missing sentences. The correct sentences are given below.

1. First paragraph, L2 “However, when [EMIM] [DCN] was used, the friction coefficient of Si_3N_4 was higher than those of the other ceramics.”
2. Second paragraph, L2 “[BMIM] [TCC] showed a lower friction coefficient for CrN and TiN than [EMIM] [DCN]; however, TiCN and TiAlN showed the opposite tendency.”

The online version of the original article can be found under doi:
[10.1007/s11249-013-0159-1](https://doi.org/10.1007/s11249-013-0159-1).

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Table 3 Physical properties of each material

Material	Method	Roughness (μm)	Hardness (GPa)	Remark
CrN	AIP	0.028	26	
TiN	AIP	0.019	30	
TiCN	AIP	0.025	41	
TiAlN	AIP	0.008	16	
H-free DLC	AIP	0.012	73	H = 0 at. %
PVD-DLC	UBMS	0.032	28	Interlayer: Cr H = 20 at. %
CVD-DLC	RF plasma CVD	0.006	24	Interlayer: Cr H = 30 at. %
Al ₂ O ₃	Sintering	0.253	18	
SiC	Sintering	0.109	22	
Si ₃ N ₄	Sintering	0.020	14	

Film thickness of all coatings was 1 μm

AIP arc ion plating, UBMS unbalanced magnetron sputtering

Fig. 2 Friction coefficient and wear scar diameter of each ceramic **Fig. 3** Friction behavior of ceramics with **a** [BMIM] [TCC] and **b** [EMIM] [DCN]