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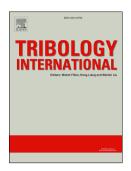
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Effect of Temperature on Tribological Performance of Polyetheretherketone-Polybenzimidazole blend 2

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8 9	All data and results are available upon requests by email to the corresponding author or tribology@imperial.ac.uk
10	ABSTRACT: Polyetheretherketone (PEEK) is one of the most commonly used High
11	Performance Polymers (HPP) although its high temperature performance is poor. In this study,
12	polybenzimidazole (PBI), a HPP with one of the highest glass transition temperatures currently
13	available, is blended to PEEK to form a 50:50 blend (TU60). Tribological performance of the
14	blend (TU60) was investigated by rubbing it against steel at temperatures up to 280°C. Results
15	obtained are compared to those from neat PEEK and neat PBI. All three polymers were
16	thermally stable during the duration of tests. However chemical analysis on polymeric transfer
17	layers on steel surfaces and polymer debris suggest polymer degradation. The degradation
18	observed is shear-assisted, possibly promoted by shear heating. Indeed the estimated interfacial
19	temperature based on Jaeger model was above the melting point of PEEK in some cases. TU60
20	outperforms PEEK in all test conditions and PBI at 280°C. TU60 formed the transfer layers on
21	steel similar to that of PEEK. When contact temperature is closed to the meeting point of PEEK,
22	PEEK in the TU60 creates a low strength transfer layer which acts as an interfacial lubricant.
23	This reduces friction which in turn reduces PBI degradation in TU60 at high temperature. This
24	work provides a strategy for creating interfacial layers to improve polymer tribological
25	performance while maintaining the integrity of the polymer.
26	KEYWORDS: tribology, high performance polymers, polymer blends, transfer layer, friction

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