FUNDAMENTAL TRIBOLOGICAL PROPERTIES OF THICK CPB

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KEYWORDS
Concentrated Polymer Brush; Ionic Liquid; Viscoelastic property

ABSTRACT
Concentrated Polymer Brush (CPB) is an assembly of polymer chains densely end-grafted to the surface. The CPB which swells in a good solvent shows excellent micro-tribological properties such as super lubrication with the extremely low friction coefficient ($\mu \sim 10^{-4}$)[1][2]. However, there are few reports about the macro-tribological properties of CPB In this work, the macroscopic tribological properties of CPB of Poly(methyl methacrylate) (PMMA) immersed in the ionic liquid. As for the ionic liquid, *N*,*N*-diethyl-*N*-methyl-*N*-(2-methoxyethyl)ammonium bis (trifluoromethanesulfonyl) imide (DEME-TFSI) was used. DEME-TFSI is the good solvent for PMMA.

The macroscopic tribological properties of CPB on SUJ2 Disk were evaluated using cylinder-on-disk tester and viscoelastic property (tanδ) of CPB were investigated by nano indentation method. As a result of these tests, friction coefficient of CPB have dependence on normal load and sliding speed.

These results show that macroscopic frictional property of CPB have relation to its viscoelastic property.

Table 1 Friction test condition

Normal load	[N]	2, 3, 5, 10, 20
Sliding speed	[mm/s]	1, 2, 3, 4, 5, 10, 15
Sliding distance	[mm]	2000
Stroke	[mm]	5
Lubricant	[μL]	300
Temperature	[℃]	25

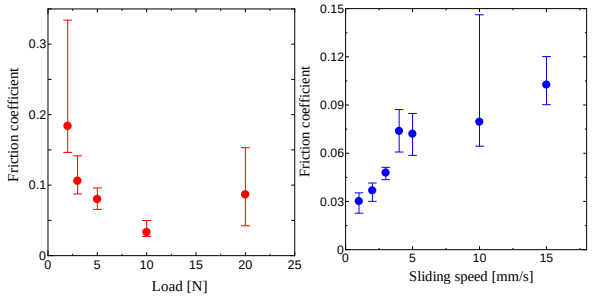

Fig.1 Relationship between friction coefficient and normal load, sliding speed

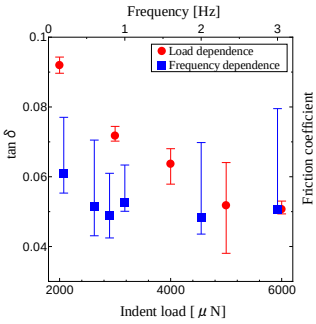

Fig.2 Relationship between tanδ and load, frequency

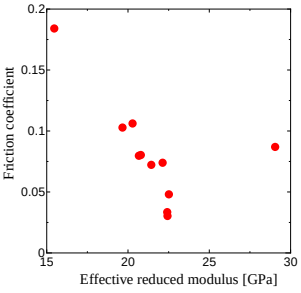

Fig.3 Relationship between friction coefficient and effective reduced modulus

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