

**A study on the friction properties of PAAc hydrogel under low loads
in air and water**

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Abstract

In recent year, have focused on hydrogels have been focused on as biotribological materials. In this study, the friction properties of poly(acrylic acid)(PAAc) hydrogel have been studied under low loads using a ball-on-plate friction tester. The influences of atmosphere (ultra pure water or ambient air), load (10-50 mN), water content (70-90 %) and its surface texture have been investigated. It was found that the friction coefficient of PAAc hydrogel was obviously lower in water than in ambient air. The friction coefficient of PAAc hydrogel decreased as the load increased, and this phenomenon was more distinct under low load. This result shows that the water wept out from hydrogel worked as a lubricant between the slider and the hydrogel surfaces. The friction property of polymer hydrogels depended on the water content, namely, the higher the water content, the lower the friction coefficient. Moreover the convex textured surface of PAAc hydrogel could effectively lead to a low friction coefficient. This means that the water at the region between convex points was easy to work as a lubricating film. The result can be explained by hydrophilic functional groups that keep the water at the interface as a lubricant.