# Tribological properties of micro/nano-textured surfaces under physiological conditions

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# Thesis Propositions

## Tribological Properties of Micro/Nano- Textured Surfaces under Physiological Conditions

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1. Texturing is commonly assumed to reduce friction by decreasing the real contact area between sliding surfaces. However, this assumption does not hold true under the physiological sliding conditions. *(This Thesis)*
2. If the stiffness difference is large between the textured and untextured surfaces while sliding, then the texture's edge effect plays a major role in increasing friction. *(This Thesis)*
3. When the stiffness is large and textures have an order of magnitude difference in their sizes (i.e., nano *versus* micro textures), larger texture edge length (which is the case for the nano texture compared to the micro texture at the same solid area fraction) results in the higher friction. *(This Thesis)*
4. When the difference of the pore texture size is not significant (i.e., less than the order of magnitude), a smaller texture size will result in a smaller stress accumulated at the texture edges from the deformation of the probe. *(This Thesis)*
5. Whereas pore and line texturing generally increases friction under physiologically-relevant sliding conditions, texturing can decrease the friction when the sliding speed is relative high with a solution with a relative high viscosity due to the compression of the texture allowing for additional fluid to escape into the interface and provide additional lubrication. *(This Thesis)*
6. The micropored surface shows a higher friction than the untextured surface even after coating with lubricious proteins (i.e., porcine gastric mucins (PGM) and reconstituted human whole saliva (RHWS)). These results could be due to the texture's edge effect and a significant stiffness difference at the interface. *(This Thesis)*
7. Unlike what has been speculated in other publications, nanoscale patterning does not necessarily mean that although the surface is smoother it will have a lower coefficient of friction when compared to microscale patterning. *(This Thesis)*
8. Textured substrates should be used with care for implant surfaces since they can increase the friction over soft tissues in physiological conditions. *(This Thesis)*
9. In a world full of competition, consistency is the strongest asset.
10. I cannot choose what I will face, but I can decide how to face it.