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Verteidigung der Dissertation

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# **Controlled orientation and periodicity of surface rippling on compliant and brittle amorphous materials induced by scanning probe lithography**

1. Periodic surface structures induced by plowing wear can be generated on compliant and brittle materials using nanoscratching or scanning probe microscopy.
2. On compliant (polymeric) materials the orientation of the periodic structures (“ripples”) can be influenced by the orientation of the structured area.
3. Certain boundary orientations can lock the ripple orientation over the whole worn region.
4. Atomic force microscopy enables the damaging and imaging of surface simultaneously or one after the other. Both processes can be observed *in situ*.
5. By repeated sliding single polymer particles can nucleate and be detached at the crests of the ripples.
6. The detached particles can be pushed by the tip to the edge of the scan area, where they pile up.
7. The detachment occurs smoothly without any abrupt change in lateral force acting on the tip.
8. Periodic surface structures are also observed in microscopic surface scratches on brittle glass.
9. The periodicity of these structures depends on scratch velocity. From theory a linear correlation is expected.
10. When a microscopic surface scratch is induced on a polished glass surface deeper polishing lines are partially remaining in the scratch groove.