

GLADOC

nanoadditive
to windshield washer fluids

reduces scratches
improves visibility
creates a protective layer
facillitates the removal
of dirt and insects

*Create an innovative
future with us.*

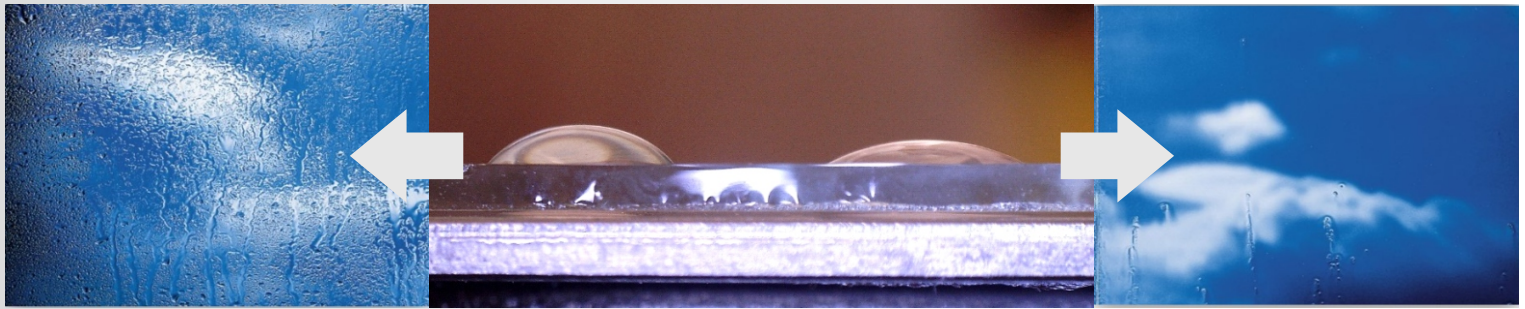
GLADOC

NanoAdditive to windshield washer fluids

GLADOC is a specially designed component for windshield washer fluids created on the basis of nanotechnology, which results in new functional properties, unattainable using traditional solutions. Regular use of windshield washer with GLADOC leads to filling the scratches, that assures improved glass translucency and its performance.

Windshield washers containing GLADOC additive show strong hydrophilic properties (picture 1), that lead to easy penetration of the surface, what ensures the quick and effective removal of dirt and insects. Elimination of minor damage of the windshield has a positive effect on: visibility while driving, driving comfort, and consequently on the safety of the driver and passengers.

GLADOC does not adversely affect on metal and rubber elements. It does not change the colour, transparency, scent or viscosity of the windshield washer fluid.



Picture 1. Comparison of the hydrophilic properties of glass pane by applying drops of water (on the left) and a drop of water with GLADOC addition (on the right).

Hydrophilic properties affect on

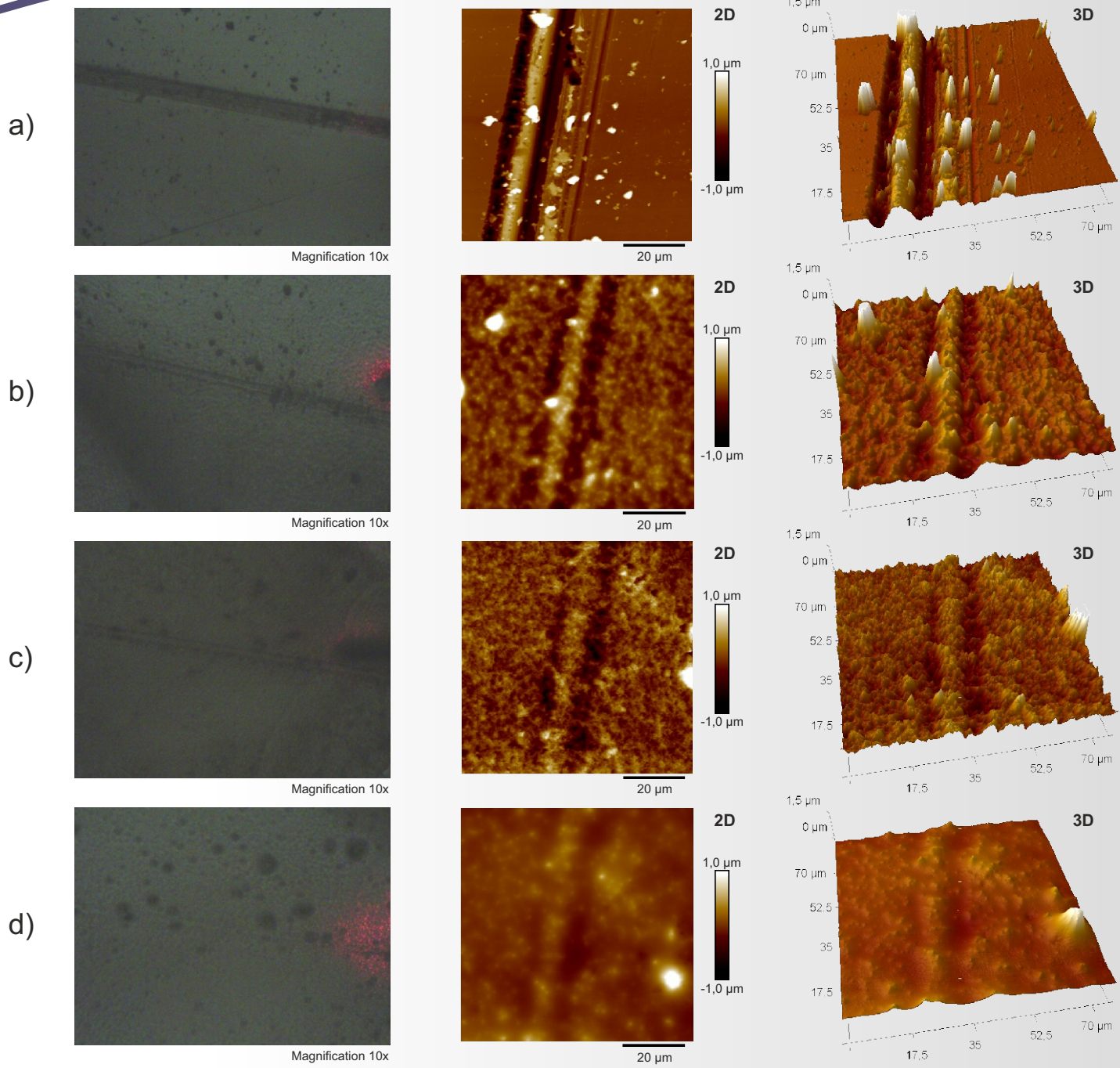
increase the efficiency
of the windshield washer fluid

reduction
of surface friction

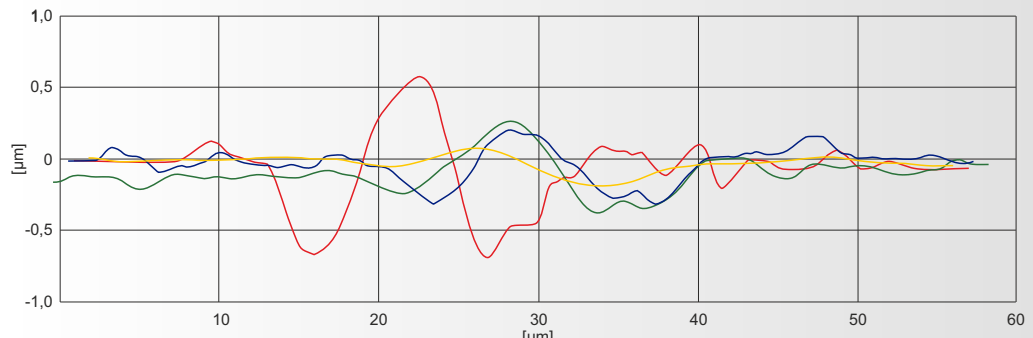
easier removal
of greasy dirt and insects

Research results show the effect of GLADOC on scratches on the car windshield. Performed measurements included examination of the effect after 3-times and 10-times coverage of the scratched area with a concentrated solution and examination of the effect after 3-times, 5-times and 7-times coverage with 1:9 dilution of GLADOC solution.

At the atomic force microscope, depth and width of scratches were investigated before and after application of nanoadditive. One drop of GLADOC or its aqueous dilutions was applied to the surface of the pane. After applying the layer, the surface was dried and another measurement was made. In the next steps, layers were applied analogously to the first time. Each subsequent layer was applied when the pane was completely dry.



Picture 2. Photos of the scratches on the glass made by optical microscope (on the left) and their two-dimensional (in the middle) and three-dimensional (right) imaging with atomic force microscope (AFM) before applying 10-times diluted aqueous solution of the additive (a) and after its 3-times (b), 5-times (c) and 7-times (d) application.



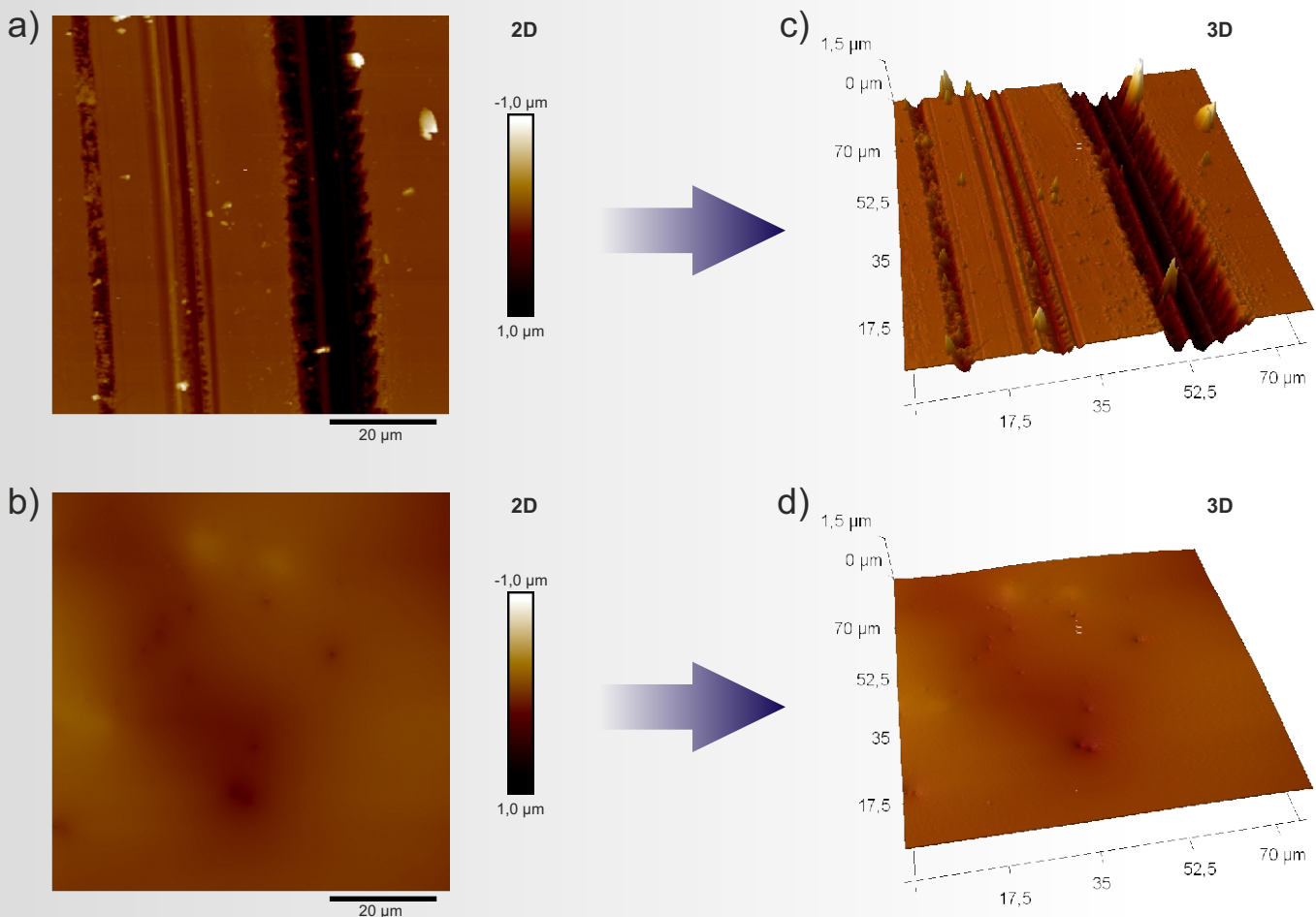
Picture 3. A comparison of the averaged depths of the scratches before application 10-times diluted aqueous solution of GLADOC (red line) and after its 3-times (green line), 5-times (blue line) and a 7-times (yellow line) overlay.

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Summary

The application of three layers of GLADOC ensures coverage of the scratches with a uniform layer. Covering the surface of the scratched glass by applying 10 layers of GLADOC completely covers the scratches, to the extent that it is impossible to locate the scratches with an optical microscope. As the number of layers increases, the depth of the cracks decreases considerably. From the initial 5 scratches, the two finest (on the right) with a depth of 84 and 172 nm, respectively, are invisible after the 3-times application of a regeneration solution (GLADOC). Other scratches reduce their depth significantly after 3-times application, respectively from the left side from 638 nm to 111 nm, from 639 nm to 228 nm and from 436 nm to 177 nm. In the case of a 7-times application, the depth of the scratches drops to 52 and 174 nm respectively (the second and third scratches cease to be distinguishable).

GLADOC has the ability to eliminate shallow scratches and significantly reduce the depth of deep scratches. The presented studies indicate that excellent effects are obtained using GLADOC as well as its aqueous dilutions. Research conducted in the independent Scientific Units confirms the effectiveness of GLADOC.



Picture 4. Two-dimensional (a, b) and three-dimensional (c, d) imaging with the atomic force microscope (AFM) of the surface of the scratched glass after applying GLADOC three times (b, d).

Research was carried out at the Faculty of Materials Science and Ceramics, University of Science and Technology in Krakow.