

Research activity in Nano and Micro Materials by: Micro and nano deposition of dispersed particles with metals and alloys to obtain functional surfaces in TRIBO - and BIOTRIBO - CORROSION SYSTEMS. (2)

Structural aspects of nano and micro composite coatings. The EDS analysis show the presence of nanosized silicon particles in the composite layer by content of carbon and silicon founded. The SEM investigations show that the composite coatings with nanosized dispersed particles develop in a nodular disturbed surface structure, as it is shown in Figure 2.

The surface morphology of composite coatings obtained by codeposition of micro SiC with nickel are presented on Fig. 4. The structure of nickel matrix is also perturbed but seems to have a more regular grain size than that in the case of nanoparticles of SiC codeposition. We suppose that the higher density of nucleation sites due to nanosized silicon carbide particles perturb the growth of nickel matrix resulting in smaller grain size and random orientation of nano composite coating.

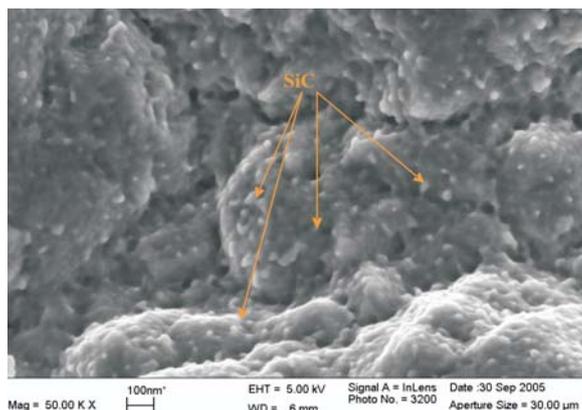


Fig. 2. SEM surface morphology of Ni-SiC (20nm) nano-structured composite coating

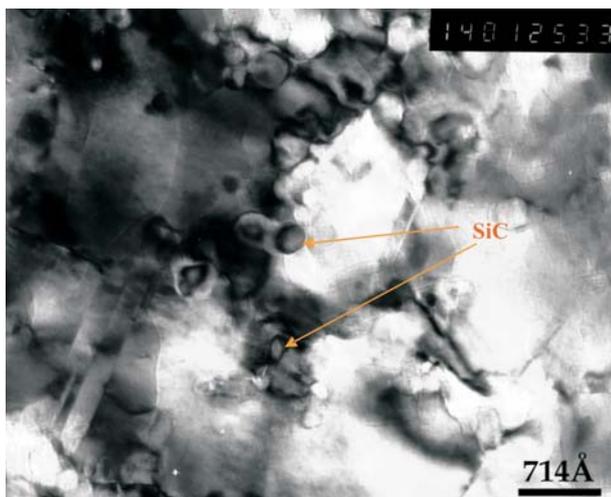


Fig. 3. TEM investigations show the presence of nano - SiC particles inside of composite coating

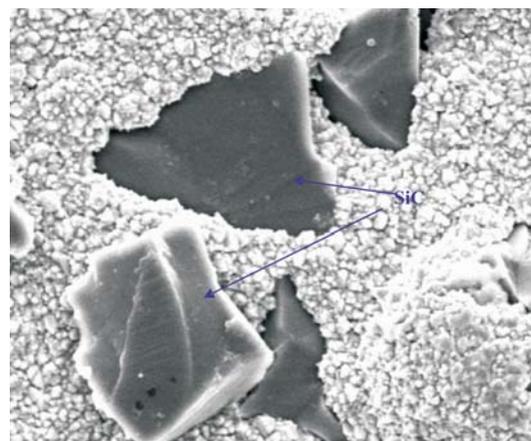


Fig. 4. SEM surface morphology of Ni+microsized SiC(30μm) composite coating

2D and 3D surface ultrahigh microtopographies. Local wear in the wear track is measured. It was deduced from surveys of the wear track recorded with an optical high resolution microtopograph, with a lateral resolution of 1 μm and a vertical resolution of 30 nm. The volume of the wear track is measured and the corresponding weight loss is calculated. On Figures 5 and 6 are presented a 3D surface and a profile measured after intermittent sliding test on Ni-SiC nanostructured composite coating, with 15N sliding force and 120 rpm, after 10000 cycles.

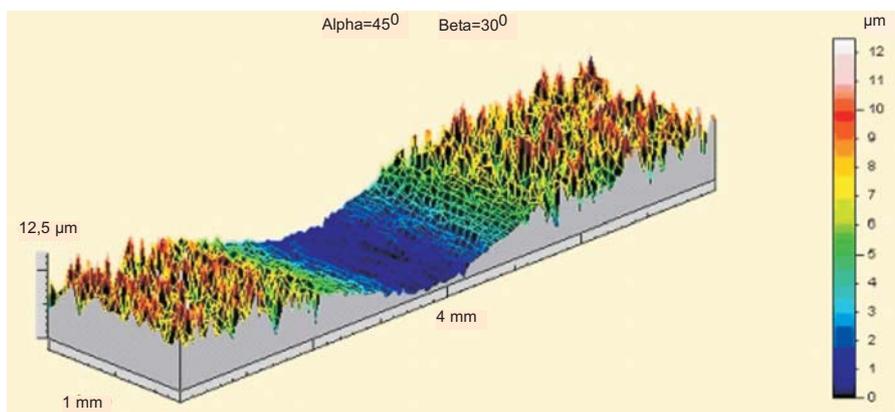


Fig. 5. 3D Microtopograph image of wear track area after continuous sliding of Ni-SiC nanostructured composite coating (Fn=15N, 120 rpm, 10 000 cycles)

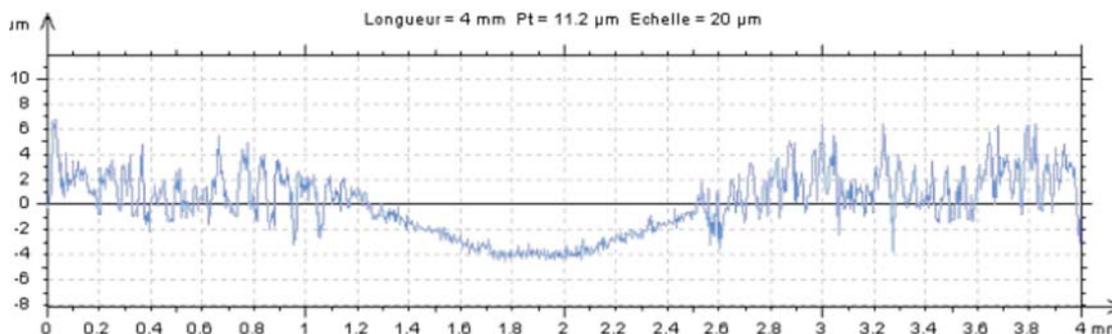


Fig. 6. 2D Microtopograph profile of wear track area after continuous sliding of Ni-SiC nanostructured composite coating (Fn=15N, 120 rpm, 10 000 cycles)

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