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THE DETERMINATION OF THE FRICTION COEFFICIENT USING NANOSCRATCHING FOR THE DEPLACEMENT OF NiP 20-60µm

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Keywords:nanoscratching, nanoindentation, the friction coefficient ,depth of scratching, distance of scratching.

Abstract: The attempts of nanoscratching and nanoindentation are intending to determinate the friction coefficient. With the nanoscratching we determinate the friction coefficient by scratching the sample. We also can determinate the depth of scratching and the distance of scratching.

1. Introduction

The attempts of nanoscratching and nanoindentation are intending to determinate the friction coefficient. With the nanoscratching we determinate the friction coefficient by scratching the sample. We, also, can determinate the depth of scratching and the distance of scratching.

2. Experimental result

The attempt of nanoscratching is developing in three stages presented in no 1 figure.

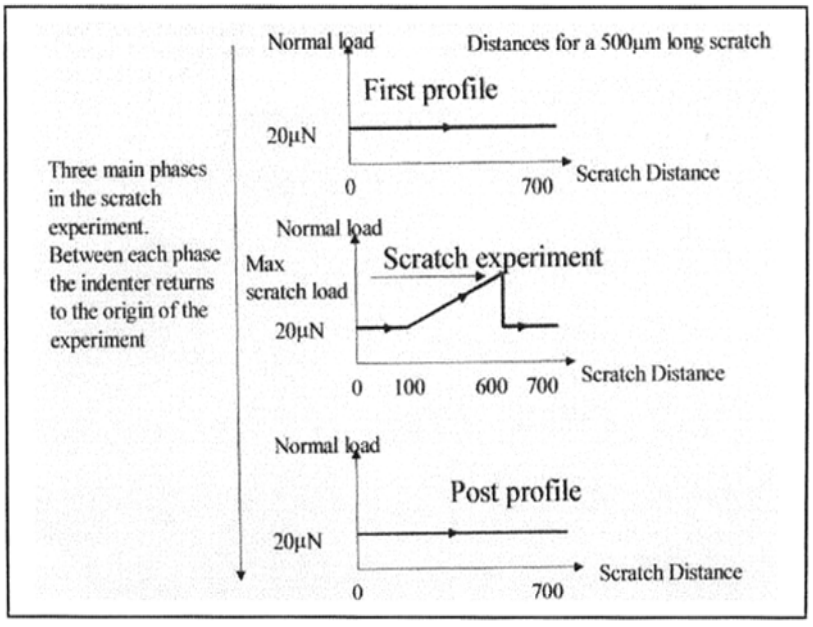

Fig.1 The stages of scratching

In the first stage it makes a study of the zone before scratching. In the second stage it applies the smallest force of the equipment, it means 20 μN. Then, it comes back at the beginning of the scratching where it applies a variable or constant force. In the third stage it studies the scratching zone. After that, we calculate the residual deformations and the elastic deformation. It can be determinated, sometime, a maximum adherence force.

For the displacement of NiP20-60μm (20 represents the phosphorus acid from the electrolyte and 60μm it means the thickness of the layer) the variation of friction coefficient, from the time of scratching, it is represented in no 2 figure.

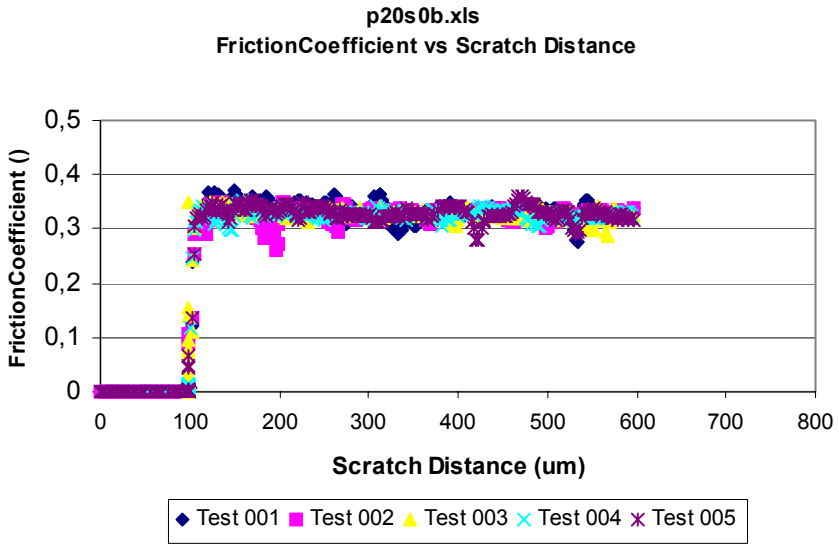

Fig.2 The variation of friction coefficient during the scratching tests

After the nanoscratching tests, the friction coefficient stay almost constantly during the tests and it is 0,3-0,35. It means that the layer has a good adherence.

In the no5 figure (a,b,c) it presents the indentor penetration during the scratching and the topography of the beam after the scratching. We can observe that the indentor is thrusting almost 750 nm for 50mN and we can see an elastic return by 350 nm.

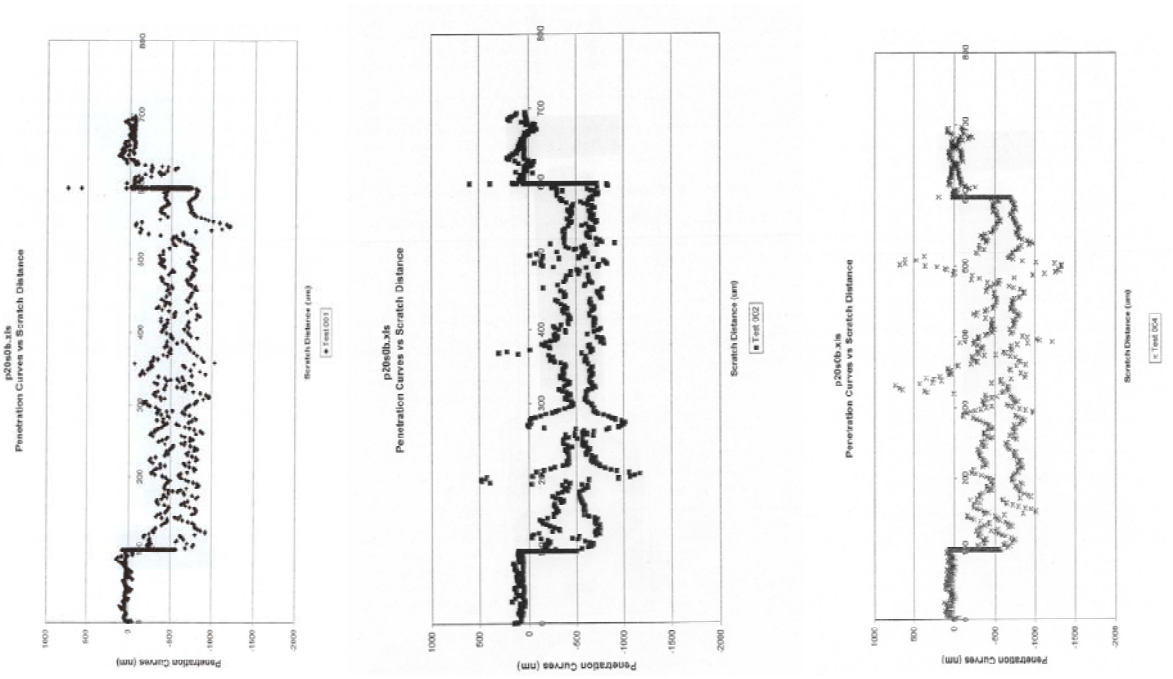

Fig.3 The indentor penetration during the scratching of NiP20-60µm layer

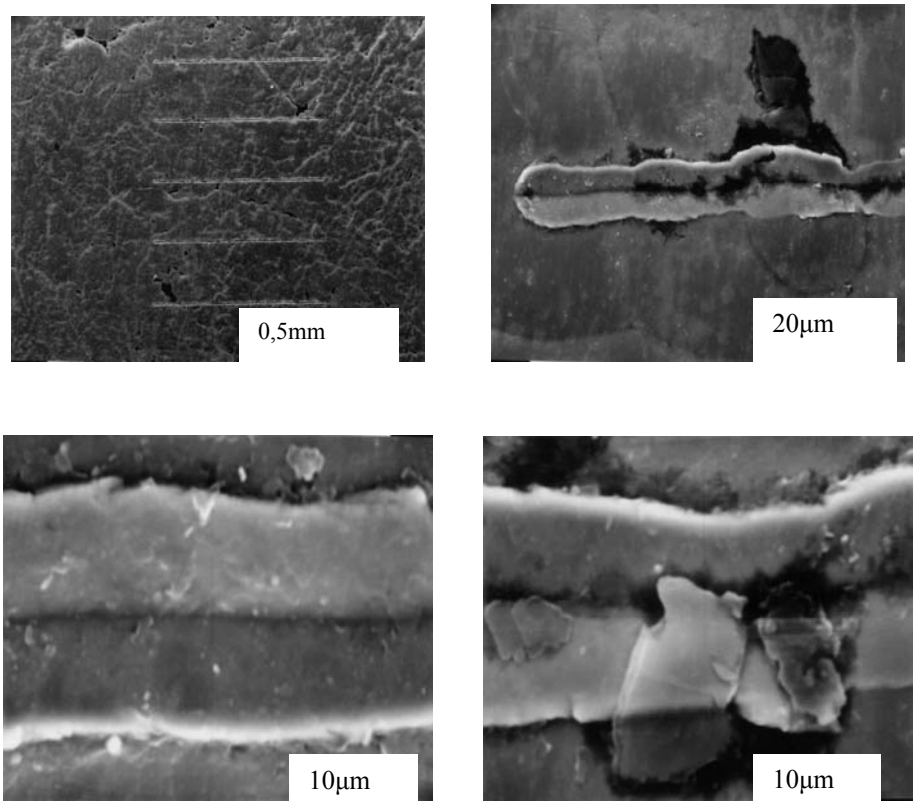

Fig. 4 The micrographics for NiP20-60µm

In the no.4 figure are presented the scratching micrographics of the NiP20-60µm.

The attempts of nanoscratching are made with the NanoHardness Tester or NHT. The NHT way of function is presented in no.5 figure.

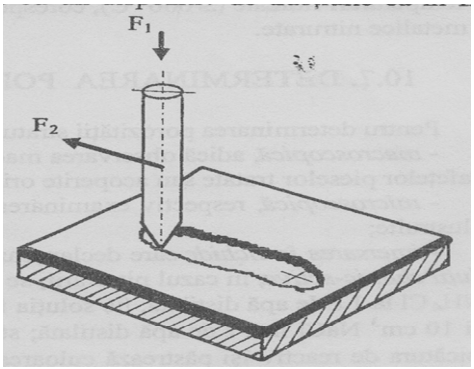

Fig.5 The NHT way of function

3. Conclusions

After the nanoscratching tests the friction coefficient stay almost constantly during the test and it is 0,3-0,35 that it means the layer has a good adherence. The indentor is thrusting almost 750 nm for 50 mN force and we can see an elastic return by 350 nm.

The attempts of nanoscratching and nanoindentation are intending to determinate the friction coefficient. With the nanoscratching we determinate the friction coefficient by scratching the sample. We also can determinate the depth of scratching and the distance of scratching.

4. References

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