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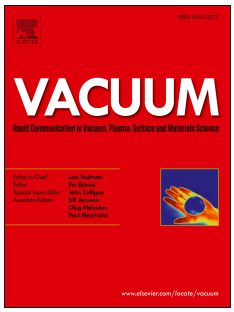

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Duplex treatment of AISI 1045 steel by plasma nitriding and aluminizing

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Abstract

Surface of medium carbon steel (AISI 1045) was modified via duplex treatment of plasma nitriding (PN) and pack aluminizing (Al). Some samples were modified via plasma nitriding and post-aluminizing (PN-Al) and the others by aluminizing followed by plasma nitriding (Al- PN) techniques. The treated samples were characterized by scanning electron microscope (SEM), X-ray diffractometer (XRD), and Vickers microhardness test. It was evident that the surface topology of duplex treated layer became coarser as plasma nitriding temperature increased to 823 K. AlN phase was the dominant phase in the duplex treated surface layers, some minor aluminide or iron nitride phases also existed. However, only AlN was detected on the steel after plasma nitriding at 823 K followed by aluminizing (PN823-Al); having the highest hardness of 1284 HV among the others.

Keyword: duplex treatment; plasma nitriding; aluminizing; aluminum nitride; steel.

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