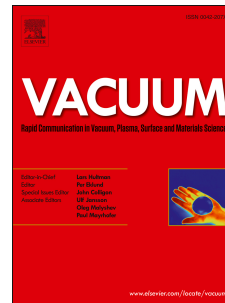


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# Nitrogen mass transfer and surface layer formation during the active screen plasma nitriding of austenitic stainless steels

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## Abstract:

Active screen plasma nitriding (ASPN), a novel surface modification process, has been widely applied to improve various surface properties of austenitic stainless steels, such as wear resistance, electrical conductivity and corrosion resistance. All the improvement of surface properties attributes to the formation of a unique phase under low nitriding temperature, called S-phase. A “sputter – deposit – decompose – diffusion model” has been established to explain the formation of S-phase, however, the mechanism of nitrogen mass transfer to the substrate during ASPN still remains controversial. By comprehensively comparing the surface responds of three different surfaces (bare 316L stainless steel surface, Au-coated 316L stainless steel surface and Si wafer surface) during ASPN treatments, this paper provides the direct evidence and clarifies the mechanism of nitrogen mass transfer between the deposition layer and the substrate during ASPN treatment.

**Keywords:** Active screen plasma nitriding; Nitrogen mass transfer; Surface structure; 316L stainless steel

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