Carbon based materials growth process effect on 304 stainless steel substrates.

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Carbon based materials have earned a well-deserved reputation. Thanks to their physical, chemical, electronic, thermal, mechanical and optoelectrical properties, research and industrial groups all over the world are constantly improving their production. They are a versatile material that can be obtained by different ways. In addition, flexible displays, sensors, and energy storage devices can be manufactured using this kind of material. The development of energy storage devices is one of the applications in which carbon-based materials, as carbon nanotubes (CNTs) or graphene nanowalls (GNWs), stand out. Another interesting aspect of these materials is that they can be obtained on conductive materials, such as nickel, copper or steel. The last one is precisely one of the substrates that we and other research groups have selected to support the carbon-based materials. In a hydrogen-rich atmosphere, at temperatures in the range 600 to 730 °C, with the use of precursor gases (acetylene or methane) and using plasma technology, uniform forests of these structures have been obtained on the surface of 304 stainless steel. However, the growth process can produce counterproductive effects on the steel substrates. Above all, decrease its flexibility, increase the crystal size or decrease its corrosion resistance. In that way, we believe it is appropriate to present some of our results observed in 304 stainless steel during our experiments. SEM images, XPS analysis and XRD allowed us to document changes in the surface and also in the bulk material.

References

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Figures

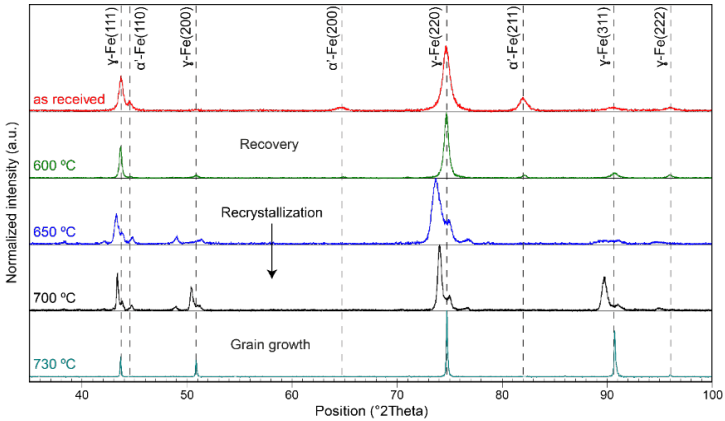

Figure 1: XRD patterns of untreated and reduced samples of 304 stainless steel at 600, 650, 700 and 730 °C