NiO Water-based Ink for the manufacture of Energy Storage Devices.

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Nowadays, Additive Manufacturing and Rapid Prototyping technologies are as attractive in research as relevant in the development of the Industry 4.0. Inkjet printing is an industrially available technique for pattern design owing to its simple, versatile and low-cost features. Moreover, the capability to build layer-by-layer schemes makes it a 3D methodology that allows printing highly accurate multilayer nanostructures. The key factor of this technique is the ink formulation. Currently, the trend is based on the development of aqueous inks making Inkjet greener and more environmentally friendly. But also the formulation of functional inks has been increased in few years to produce prints for technological applications, such as batteries and supercapacitors (SCs); where miniaturization of these chip devices could improve power supply by eliminating complex connections of the conventional systems or improving electrodes performance. In this frame, NiO patterns could be the proof of concept, thanks to its excellent electrochemical performance due to its high theoretical specific capacitance and chemical stability.

This work is focus on the formulation, development and optimization of a $Ni(OH)_2$-based ink for this attractive prototyping technology. In addition, we present the electrochemical performance overview of the as-prepared electrodes. The NiO based SCs show an excellent cycling stability with a capacitance retention of 100% after a thousand of charge-discharge cycles with competitive specific capacitance values.

References

[1] Yus, J., Gonzalez, Z., Sanchez-Herencia, A.J., Sangiorgi, A., Sangiorgi, N., Gardini, D., Sanson, A., Galassi, C., Caballero, A., Morales, J., Ferrari, B., 2019. J. Eur. Ceram. Soc. Volume 39, Issue 9, August 2019, Pages 2908-2914.

Figures

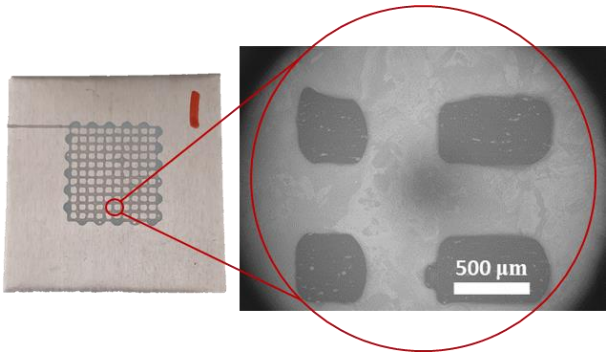

Figure 1: Picture and micrograph of the green-electrode.

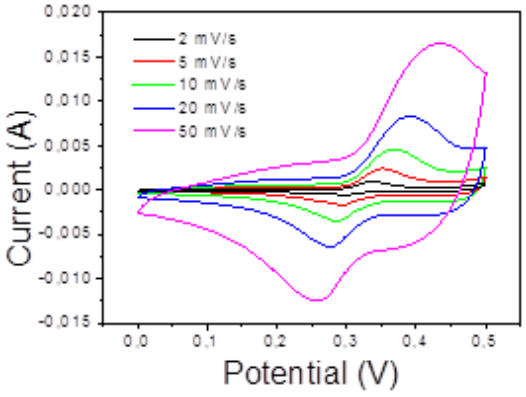

Figure 2: Electrochemical response. Cyclic voltagrams at different scan rates. (b)