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Title: Structural Investigations of AuNi-Aerogels

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ABSTRACT (Space limited to 2200 characters)

Aerogels are well known for their large specific surface area and total pore volume. Consequently, pure metal-based aerogels exhibit a high catalytic activity for various reactions. However, it became a trend in recent years to synthesize metal aerogels only in specific compositions and morphologies. To give a more comprehensive overview of the influence of the composition and morphology on the structural properties, we herein report the synthesis of different variants of novel AuNi-aerogels. This was carried out by the well-known synthesis routes of the one-step-gelation [1], two-step-gelation [2] and galvanic exchange [3]. Followed by a detailed examination of the physicochemical properties and elemental distributions.

Aerogels obtained via the one-step-gelation exhibit a single phased fine homogeneous gel structure with small web thicknesses. The two-step-gelation yields a novel gel structure consisting of a AuNi framework in which seamlessly Ni nanoparticles are integrated. To initiate the gelation a variety of different salts were comprehensively studied in which especially chloride salts and $NaBH_4$ were most potent. The hollow sphere aerogels are based on AuNi Nanoparticles with a thin shell and a broad hollow interior as building blocks.

In conclusion, the electrochemical stability and performance of all aerogels was tested for the model reaction of ethanol oxidation. Thereby, the morphology holds a significant influence on the electrochemical performance which decreases in the order one-step-gelation, galvanic replacement two-step-gelation [4].