

Title: **Electrosynthesis of nanowires for potencial application in biomedicine.**

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The increasing research in nanotechnology field has improved the methods for synthesizing the nanostructures with different shapes, sizes and compositions. Thanks to electrochemical techniques such as electrodeposition and the use of polycarbonate membranes with Au face, the synthesis of nanowires was possible. Using an electrolyte solution which contains Co(II) and Ni(II) cations with a specific concentration, the wished composition of CoNi metal is achieved. Moreover, the shape and size directly depend on the nanochannels of the membrane. Firstly, a voltamperometric study was done in order to optimize the deposition process and hence, it was possible to obtain the appropriate working potential to reduce both metal ions at a controlled rate. The subsequent synthesis of CoNi nanometric films over a Si/Ti/Au piece (cathode) allowed the control over electrochemical techniques. The nanowires of CoNi was synthesised at -1.0 V and different deposition charges were applied, -4.40 C or -2.50 C. The variation of deposition charge was related with nanowire length: as more charge more length. In addition, two electrolyte solutions were employed: aqueous with Co(II) and Ni(II) cations and a microemulsion (ionic liquid/water). The surface of nanowires varies according to which solution is used, so in the case of the aqueous solution nanowires are compact and in the case of the microemulsion are porous. Once synthesized the two types of nanowires, a full characterization by means of scanning and transmission electronic microscopes (SEM and TEM) was carried out. These experiments allowed the analysis of the nanowires sizes and the comparison between the different morphology of compact and porous nanowires. The length varied with deposited charged and the diameter depended on the size of nanochannels from the polycarbonate membrane, in particular, in this work was 100 nm. Finally, nanowires were covered with a gold layer and functionalized with organic molecule to make them biomedically useful. As a matter of fact, the drugs can be attach to nanowires so they can be used as a

carriers of drugs using their magnetic properties that makes dirigibles applying an external magnetic field.

Keywords: electrochemical synthesis, electrodeposition, CoNi nanowires, SEM, TEM, biomedically useful, means of transporting drugs