Can a graphene barrier layer between copper and gold block pore corrosion in connecting devices?

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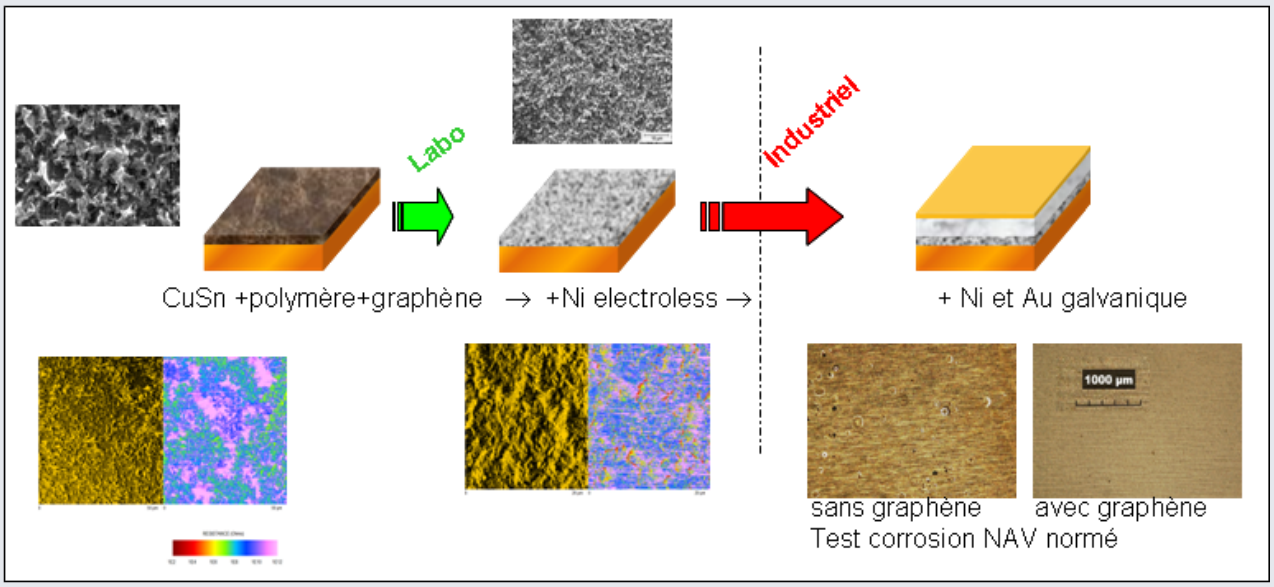
From results obtained at CEA (patent FR1452978) on a grafting process of graphene on any type of substrate, a program was launched to elaborate a graphene polymer layer on copper substrates for electronics applications. The aim is to diminish pore corrosion observed on galvanic gold coatings. We have elaborated polymer/graphene composite layers on large industrial cuprous substrates. Using electrical characterizations techniques both at the microscopic level (conducting probe AFM) and macroscopic one (4 point probe) we have optimized the choice of polymer (here P4VP), concentrations and treatments in order to have reproducible and conducting layers. Percolation of the graphene flakes was the main issue for the electrical properties. We have shown that a thin electroless nickel film could cap the graphene/polymer composite and increase the conduction paths. Finally industrial Ni/Au final coatings were electrodeposited and normalized industrial corrosion tests performed on samples deposited In different conditions. Major protection against pore corrosion was observed for the samples with the graphene/polymer barrier which hinders the diffusion of copper up to the surface.



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