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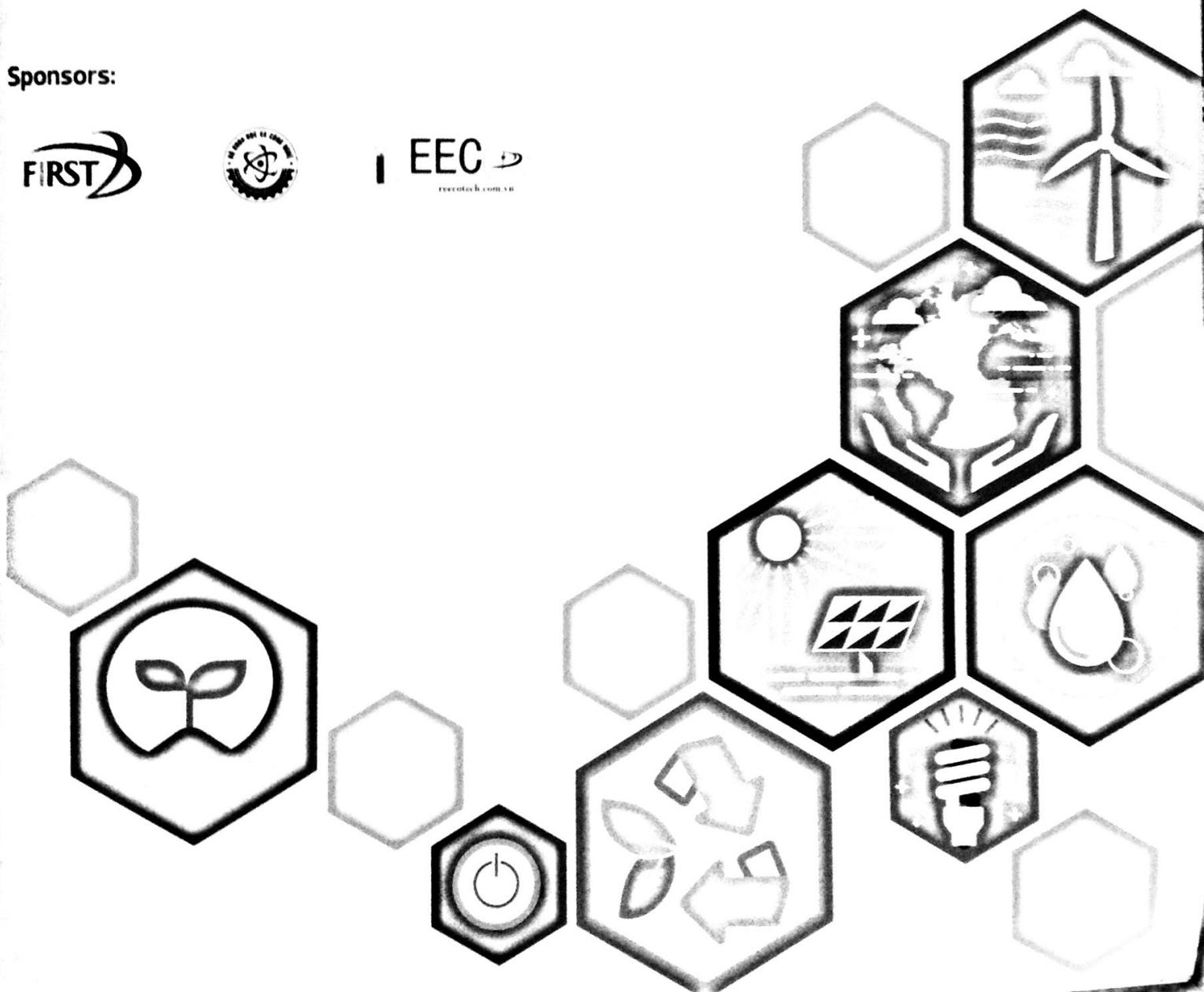
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY, VIETNAM

VIETNAM - UK RESEARCHER LINKS WORKSHOP

GREEN ELECTROCHEMICAL AND MATERIALS PROCESSING FOR ENVIRONMENT AND ENERGY CHALLENGES

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PLATING TECHNOLOGY OF NANO, MICRO COMPOSITE Ni-CeO₂CuO; Ni-TiO₂ AND Ni-CBN FOR MANUFACTURING OF FUNCTIONAL COATINGS

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Functional coatings are increasingly being applied in a wide range of areas for technological change, technical and economy efficiency, particularly in chemical engineering and mechanical engineering. Composite plating technique with nanoparticles and microparticles can create conventional metal surfaces with special functions such as special catalytic capabilities for treating pollutant emissions environmental impact and superhydrophobic surface for the materials with clean up character or hardening, abrasion resistance used to make cutting tools, grinding in mechanical processing. The use of sulphate solution-plating containing of inert electrochemical nanoparticles CeO₂ 6.4 g/L and CuO 1.6 g/L, at current density 2 A/dm², stirring speed 600 rpm can obtain Ni-CeO₂-CuO composite nanoparticles on steel. The contents of catalytic particles in nanocomposite layer are: CeO₂ 31.90 % and CuO 4.46 % and can catalyze CO oxidation to 100 % at temperature ≥ 300 °C and C_xH_y to 85,76 % at temperature 500 °C. Using a TiO₂ with concentration of 6 g/L in the nickel chloride solution at a current density of 3 A/dm² for 20 min was obtained the nanocomposite Ni-TiO₂, which has superhydrophobic surface structure with wetted angle 164.7°. In addition, the Watt's nickel-plating containing of inert electrochemical CBN grits 90 ÷ 106 μ m in size with concentration 160g/L, at current density of 3 ÷ 8 A/dm² and appropriate arrangement of cathode as well as rotational speed can form micrometer composite Ni-CBN layer. Because CBN grits are buried 2/3 of particle size and evenly distributed on the surface, the grinding and cutting ability of the abrasive tool is equivalent to the Japanese manufactured product.

Keywords: Nano-micro composite plating, CeO₂-CuO plating, CO and C_xH_y oxidation, Ni-TiO₂ superhydrophobic surface, CBN abrasive plating.