Pulse jet electrodeposition of nanocrystalline copper and its application as an electrical discharge machining electrode

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A nanocrystalline copper electrode material was fabricated using the pulse jet electrodeposition method on a stainless steel rod. The microstructure evolution and grain size were examined using scanning electron microscopy and X-ray diffraction. The nanocrystalline copper had a fine microstructure comprising nanosized grains with a size of 28 nm at a peak current density of 400 A/dm² and a pulse duty circle of 1:6. An electrode material mass loss experiment was conducted between the nanocrystalline copper electrode prepared by pulse jet electrodeposition and a conventional electroformed coarse copper electrode. The results show that the relative mass loss factor of the pulse jet electrodeposited copper electrode was obviously lower than that of electroformed coarse copper and reached a minimum value of 0.25% with an applied EDM peak current density of 3 A /dm².

Keywords: Electrode performance; pulse jet electrodeposition; nanocrystalline copper

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