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Effect of Mo and Y_2O_3 additions on the microstructure and properties of fine WC - Co cemented carbides fabricated by spark plasma sintering

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Abstract: The effects of Mo and Y_2O_3 additions on the microstructure and properties of fine WC-6Co cemented carbides prepared by spark plasma sintering (SPS) were investigated. The microstructure, mechanical properties and corrosion behavior were analyzed by SEM, TEM, XPS, mechanical property tests and potentiodynamic polarization curve measurements. The results show that there are no significant differences in the microstructure and properties of alloys with 1.0 % Y_2O_3 addition. However, the addition of Mo was beneficial for refining the WC grains. The hardness of alloys increased until the maximun value, and then followed a decreasing trend with the increase of Mo content. In addition, the relative density of alloys decreased with the increase of Mo addition, which caused to an obvious decline in fracture toughness. With the additions of Mo and Y_2O_3, the corrosion resistance of alloys improved significantly both in acid and alkaline solutions (0.1 M HCl and 0.1 M NaOH solutions). The adding amount of Mo should be controlled within a certain

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