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# Influence of sintering temperature on thedensification of copper matrix composite reinforcedwith CoAl particle developed by SHS

**kahina kheloui, Said Azem, Mustapha Nechiche**

**Abstract :** This work focuses on the influence of the sinteringtemperature of a copper matrix composite and CoAl particlesproduced by SHS (Self Propagating High temperatureSynthesis).In a first step, Co-50at.%Al mixture is sintered at 950°C to obtainthe CoAl compound that will be milled for 24 hours and sinteredin presence of copper in order to a preparation of a metal matrixcomposite. Then, the CoAl-50wt. %Cu mixtures are compressedunder a pressure of 350MPa and sintered at two differenttemperatures (solid and liquid phase) under argon.The SEM examination of the composite sintered in solid phaseshows the ramifications of copper in CoAl particles, whichhighlights a diffusion of Cu through the nano pores particles.Some particles present a phase contrast, which reveals theinhomogeneity of diffusion. The EDS-X analysis confirms thisresult since we find an important quantity of copper inside aparticle. The Cobalt and aluminum are also found in the matrix.Moreover, the discontinuity is observed with the interface CoAlCu. It seems that liquid sintering phase would leads to ahomogeneous diffusion, better wetting of particles and higherdensification. A sphering of CoAl particles is also observed in thecase of the composite sintered in liquid phase, which reflects thephenomenon of dissolution-precipitation at the edges of CoAlparticles.To a complementary results, X-ray diffraction analysis (XRD)was also performed. The diffractogram of CoAl-Cu compositesintered in liquid phase reveals the presence of Cu and CoAl withshift of the Cu peaks to the left, reflecting an increase in theparameter. This swelling of the mesh of copper is due to thesubstitution of copper atoms by those of aluminum and cobalt.After the calculation of the open porosity in the compositessintered in liquid and solid phase, we found a better densificationof the composite sintered in liquid phase with a rate porosity of2%.

**Keywords :** composite materials, intermetallics, SHS, SEMEDS X, XRD