203-018 Production of graded composites of AA2011 / mulite microparticles by thixoforming
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The work investigates the viability of the production of graded composites by thixoforming; AA2011 alloy (Al-5Cu) and microparticles of mulite are used as matrix and reinforcing material, respectively. Different configurations of reinforced layers in the product are tested; processing parameters and their effect upon the quality of the final product are investigated, searching for the process optimization. Microstructures and interactions between matrix and ceramic particles are investigated and related to processing parameters. Results show that composites containing alternate layers of metal and composite can be produced when proper thixoforming conditions are employed. For the system investigated, the best operational conditions were: thixoforming temperature 640C (liquid fraction around 0.7); thixoforming pressure 3MPa; reinforcement weight fraction around 30% in the composite layer. In the composite layers reinforcing particles are located in the interglobular regions of the thixotropic material (boundaries among globular solid phase in the semisolid slurry at high temperature), as well as within the globular phase itself - in regions occupied by entrapped liquid in the slurry).