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纯铝粉末多孔烧结材料等通道转角挤压

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摘 要: 以纯铝粉末多孔烧结材料为研究对象, 在200 ℃下采用粉末包套-等通道转角挤压工艺制备了完全致密的块体超细晶材料, 研究在挤压过程中3种路径(A、B_C、C)对其组织和性能的影响。结果表明: 在3种路径挤压下均实现了材料的晶粒细化与致密, 其中路径B_C和路径A的细化效果优于路径C; 以细化效果最佳的路径B_C为例, 初始平均粒径为46.8 μm, 相对密度为0.88的粗大等轴晶组织经过4道次挤压后得到平均粒径为1.5 μm完全致密的超细晶组织, 且屈服强度比初始时提高了两倍以上; 3种路径下显微硬度与挤压道次的关系基本一致, 即一次挤压后硬度比初始值提高了75%, 之后随着挤压道次的增加, 硬度增加趋于缓慢。

关键字: 粉末烧结材料; 组织; 性能; 包套-等通道转角挤压

Equal channel angular pressing of pure Al powder sintered material

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Abstract: Pure aluminium sintered material was successfully consolidated into fully dense bulk material by powder in tubes-equal channel angular pressing at 200 ℃. During the pressing, the effects of three routes (A, B_C, C) on the structure and properties were studied. The results show that the materials are refined and compacted after pressing through three kinds of routes. The refining effect of routes B_C and A are better than that of route C. Using route B_C as example, the initial coarse equiax-grained microstructure with relative density of 0.88 and mean grain size of 46.8 μm becomes fully dense ultra-fine grained microstructure with mean grain size about 1.5 μm after four pressing passes. The yield strength is two times higher than that of sample before ECAP processed. The relationship between the microhardness and pressing passes under three routes is the same, that is to say the microhardness increases 75% after one pressing, while increases slightly where after.

Key words: powder sintered material; microstructure; properties; tubes-equal channel angular pressing

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