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挤压成型对LC4CS铝合金棒材阳极氧化膜结构的影响

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Effect of Extrusion on Microstructure of Anodic Oxide Films Formed on LC4CS Aluminium Alloy Bars

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摘要

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摘要 研究了挤压成型对LC4CS铝合金棒材表面阳极氧化膜微观结构的影响。采用金相显微(OM)技术、扫描电镜(SEM)和能谱分析(EDS)等方法分析了铝合金基体中合金相的种类和分布、组织结构的变化规律以及阳极氧化膜的表面及断面形貌。研究发现,试样表面阳极氧化膜的结构特征与基体组织特征具有一致性。基体中的阳极相和阴极相颗粒分别导致了氧化膜中孔洞和夹杂缺陷的产生,在挤压变形中形成的析出相带以及不完全再结晶组织是造成氧化膜中凹坑结构和复杂网纹结构的主要原因。

关键词: 阳极氧化 挤压成型 析出相 凹坑 网纹结构

Abstract: Effect of forward extrusion distortion on the anodic layers formed in sulfuric acid on LC4CS alloy bars is studied. The microstructure of the substrates is assessed by optical microscopy (OM). The surface and cross section morphologies of oxide layers are examined by scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). The oxide layers developed a microscale topography which is determined by the morphology of the extrusion bar substrates. Preferential dissolution of second phase particles containing copper or magnesium leads to cavity defects of the layers, and insoluble impurities tend to be occluded in oxide layers whenever the particles are present in the substrate/oxide interface. Preferential dissolution of cracked particle chains forms during extrusion is the main reason of pits in oxide layers and the scalloped substrate/oxide interface. The netlike structure of the layers is caused by grain or subgrain boundaries in the incompletely recrystallized alloy substrate.

Keywords: anodic oxide extrusion intermetallic particles pits netlike structure

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