

ABSTRACT

Ti-Mg alloy has desirable mechanical and other properties but is difficult to form by conventional ingot metallurgy. This work reports the results of a hydrometallurgical investigation on the recovery of Ti-Mg alloy powder synthesized from mechanochemical processing (MCP) of TiO_2 with Mg (15 wt.% beyond stoichiometric). The MCP synthesized alloy powder is intrinsically mixed with MgO and other oxides of Ti. The objective was thus to find a leachant that can leach out the by-products of the MCP process. Different inorganic and organic acid media, and their combinations, were used to try and recover a pure isolated Ti-Mg powder.

For comparison purposes, the dissolution of individual particulate polycrystalline MgO and TiO_2 , and Ti-20Mg (obtained from milling blended elemental powders) was also investigated. The study indicated that separation with inorganic acids (HCl, H_2SO_4 , and aqua regia) was not possible since as high as 80% of the milled Ti-Mg alloy powder was dissolving, yet the target TiO_2 was still undissolved under the same conditions. Recovery of Ti-Mg powder was not achieved with organic acids as well because MgO and TiO_2 showed marked resistance to dissolution and hence would contaminate the alloy powder. There was drastic co-dissolution of MCP TiO_2 -Mg in combined HCl/organic acids while the TiO_2 resisted dissolution.