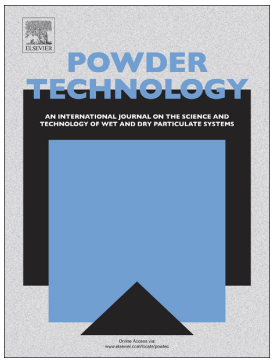

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Milling effect on the microstructural and hydrogenation properties of $TiFe_{0.9}Mn_{0.1}$ alloy

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Abstract

TiFe is a remarkable hydrogen storage alloy thanks to its reversibility at ambient temperature and pressure, high capacity and low cost. However, activation and sorption kinetics should be improved for practical applications. The effect of mechanical milling on the morphological, structural and hydrogen sorption properties of powdered $TiFe_{0.9}Mn_{0.1}$ alloy has been determined. Pristine alloy powder with mean particle and crystal sizes of 45 μm and 30 nm, respectively, was used as a reference. The pristine powder was ball milled for different times up to 5 hours leading to significant changes in microstructural properties already observed after 0.5 hour of milling. For such short milling time, the particle and crystal sizes decrease by a factor of five and three, respectively, with minor formation, if any, of amorphous phases. These microstructural changes promote a reduction of the activation time towards hydrogen absorption by a factor of five and enhance sorption kinetics. Besides, the