

# Etude expérimentale et modélisation des cinétiques de transformation de phase dans un alliage de titane

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**Abstract:** The aim of this thesis is to experimentally study and to model the kinetics of  $\beta + \beta' \rightarrow \beta''$  phase transformations in Ti-6Al-4V alloy for isothermal and non-isothermal conditions. To this purpose, several technics have been performed (DSC, SEM, optical microscopy, in-situ electrical resistivity and XRD). The KM-JMA equation has been used to describe the kinetics of phase transformations during isothermal holdings. An approach based on the additivity rule has been developed to adapt the KM-JMA equation to non-isothermal phase transformations and is compared to the one using the fictitious time. Kinetics parameters (n, k and Q) have been determined using this approach and discussed based on the microstructural analysis. Mechanisms of the  $\beta + \beta' \rightarrow \beta''$  phase transformations have been discussed by considering the microstructural analysis and the kinetics parameters already determined. Finally, the  $\beta''$  phase transformation kinetics in isothermal conditions has been simulated with the MatCalc software and modelled using both the nucleation – growth theory and the KM-JMA equation.

**Keywords :** Ti-6Al-4V, KM-JMA, additivity, nucleation – growth