





Parametrization of the mechanically induced self-propagating high-temperature synthesis (MI-SHS) of Ti_5Si_3

E.A. Juárez-Arellano ^a  , A. Martínez-García ^a, B. Winkler ^b, T. Pérez-López ^c, J.M. Padilla ^d

Show more 

 Share  Cite

<https://doi.org/10.1016/j.ceramint.2022.09.203> 

[Get rights and content](#) 

Abstract

Mechanically activated self-propagating high-temperature synthesis (MA-SHS) is one of the most used methodologies to synthesize titanium silicides, especially Ti_5Si_3 . However, the problem in this methodology is to know the milling conditions needed to mechanically activate (MA) or mechanically induce (MI) the reaction of the starting materials. This information is fundamental for obtaining reproducible results. Therefore, the parametrization of the mechanically induced self-propagating high-temperature synthesis (MI-SHS) of Ti_5Si_3 is explored in the present study. A simple kinematic approach is used to parametrise the mechanically induced reaction as a function of the milling parameters, such as the angular velocity of the mill and the grinding time. The accumulated and transferred energy per hit needed to induce the MI-SHS of Ti_5Si_3 are predicted. A kinetic approach that allows the complete parametrization of mechanically induced reactions is also used.

Introduction

Titanium silicides have attracted increasing attention due to their specific physical and chemical properties. From the Ti–Si system, the Ti_5Si_3 intermetallic is the most studied due to its high