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Concentrated solar energy used for sintering magnesium titanates for electronic applications

Irina Apostol^a, Jose Rodríguez^b, Inmaculada Cañadas^b, Jose Galindo^b, Senen Lanceros Mendez^c, Pedro Libânio de Abreu Martins^c, Luis Cunha^c, Kandasamy Venkata Saravanan^{d*}

^a S.C. IPEE Amiral Trading Impex S.A., 115300 Curtea de Arges, Romania

^b CIEMAT- Plataforma Solar de Almeria, E-04200 Tabernas, Almeria, Spain

^c Physics Department - Centre of Physics, University of Minho, 4710-057 Braga, Portugal

^d Department of Physics, School of Basic and Applied Science, Central University of TamilNadu, Thiruvarur 61010, India

Highlights

- Different ratios of MgO/ TiO₂ ceramics were prepared by solid state reaction technique.
- The compositions were (MgO)_{0.52}(TiO₂)_{0.30}, (MgO)_{0.40}(TiO₂)_{0.41}, and (MgO)_{0.50}(TiO₂)_{0.50}
- We sintered (MgO)_{0.52}(TiO₂)_{0.30}, (MgO)_{0.40}(TiO₂)_{0.41}, (MgO)_{0.50}(TiO₂)_{0.50} ceramics samples in air at about 1100°C for 1h, 2h and 3h in the solar furnace.
- The structure, microstructure and dielectric properties of the solar sintered samples were studies and is presented.

Abstract

Solar energy is an important renewable source of energy with many advantages: it is unlimited, clean and free. The main objective of this work was to sinter magnesium titanate ceramics in a solar furnace using concentrated solar energy, which is a novel and original process. The direct conversion of solar power into high temperature makes this process simple, feasible and ecologically viable/ environmentally sustainable. We performed the solar sintering experiments at Plataforma Solar de Almeria-CIEMAT, Spain. This process takes place in a vertical axis solar furnace (SF5-5kW) hosting a mobile flat mirror heliostat, a fixed parabolic mirror concentrator, an attenuator and a test table the concentrator focus. We sintered (MgO)_{0.63}(TiO₂)_{0.37}, (MgO)_{0.49}(TiO₂)_{0.51}, (MgO)_{0.50}(TiO₂)_{0.50} ceramics samples in air at about 1100°C for a duration of 16 minutes, 1h, 2h and 3h in the solar furnace. The

^{*} Author to whom correspondence should be addressed.

E-mail: venketvs@cutn.ac.in Tel.: +91-9489054289

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