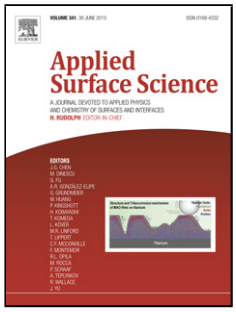

Title: Design and Fabrication of Spectrally Selective Emitter for Thermophotovoltaic System by using Nano-Imprint Lithography

Authors: Jong-Moo Kim, Keum-Hwan Park, Da-Som Kim, Bo-yeon Hwang, Sun-Kyung Kim, Hee-Man Chae, Byeong-Kwon Ju, Young-Seok Kim

PII: S0169-4332(17)32310-3
DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2017.07.300
Reference: APSUSC 36834

To appear in: *APSUSC*

Received date: 18-4-2017
Revised date: 25-7-2017
Accepted date: 31-7-2017

Please cite this article as: Jong-Moo Kim, Keum-Hwan Park, Da-Som Kim, Bo-yeon Hwang, Sun-Kyung Kim, Hee-Man Chae, Byeong-Kwon Ju, Young-Seok Kim, Design and Fabrication of Spectrally Selective Emitter for Thermophotovoltaic System by using Nano-Imprint Lithography, Applied Surface Sciencehttp://dx.doi.org/10.1016/j.apsusc.2017.07.300

Design and Fabrication of Spectrally Selective Emitter for Thermophotovoltaic System by using Nano-Imprint Lithography

[1, 3]Jong-Moo Kim, [1]Keum-Hwan Park, [4]Da-Som Kim, [3]Bo-yeon Hwang, [4]Sun-Kyung Kim, [2]Hee-Man Chae, [3]Byeong-Kwon Ju[*] and [1]Young-Seok Kim[*]

[1]*Display Components & Materials Research Center, Korea Electronics Technology Institute*

68 Yatap-dong, Bundang-gu, Seongnam 13509, Korea

[2]*Civil-MilitaryTechnology Cooperation Center, Agency for Defense Development*

Yuseong P.O.Box 35-8, DaeJeon, 34188, Korea

[3]*Department of Electrical Engineering, Korea University*

Anam Campus, Anam-dong 5-ga, Seongbuk-gu, Seoul, 02841, Korea

[4]*Department of Applied Physics, Kyunghee University*

1732 Deogyeong-daero, Giheung-gu, Youngin, 17104, Korea

[*]Phone: +82 31 789 7434, Fax: +82 31 789 7439, E-mail: vis4freedom@keti.re.kr

HIGHLIGHTS

- Some design rules based on finite difference time domain simulation results for 2D tungsten selective emitter are presented.
- New process, nanoimprint lithography (NIL) method with minimal process steps is used to fabricate a large-area selective thermal W emitter.
- Fabricated W selective emitter shows thermal stability at 1,300K.
- Compared with bare W, total efficiency of TPV system which is using the 2D tungsten selective emitter had almost 2.5 times enhanced

Abstract

Thermophotovoltaic (TPV) systems have attracted attention as promising power generation systems that can directly convert the radiant energy produced by the combustion of fuel into electrical energy. However, there is a fundamental limit of their conversion efficiency due to the broadband distribution of the radiant spectrum. To overcome this problem, several spectrally selective thermal emitter technologies have been investigated, including the fabrication of photonic crystal (PhC) structures. In