

TWENTY-SECOND ANNUAL CONFERENCE

YUCOMAT 2021

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TWENTY-SECOND ANNUAL CONFERENCE

YUCOMAT 2021

Hunguest Hotel Sun Resort, Herceg Novi, Montenegro

August 30 - September 3, 2021

<http://www.mrs-serbia.org.rs>

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Organised by:

Materials Research Society of Serbia

Endorsed by:

Federation of European Material Societies

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

66.017/.018(048)

DRUŠTVO za istraživanje materijala Srbije (Beograd). Godišnja konferencija
(22 ; 2021 ; Herceg Novi)

Programme ; and the Book of abstracts / Twenty-second Annual Conference YUCOMAT
2021 Herceg Novi, Montenegro, August 30 - September 3, 2021 ; organised by Materials
Research Society of Serbia ; [editor Dragan P. Uskoković]. - Belgrade : Materials Research
Society of Serbia, 2021 (Herceg Novi : Biro Konto). - XXXIII, 146 str. : ilustr. ; 23 cm

Tiraž 150. - Bibliografija uz pojedine apstrakte. - Registar.

ISBN 978-86-919111-6-4

а) Наука о материјалима - Апстрактиб) Технички материјали—Апстракти

COBISS.SR-ID 44447497

Title: THE TWENTY-SECOND ANNUAL CONFERENCE
YUCOMAT 2021
Program and Book of Abstracts

Publisher: Materials Research Society of Serbia
Knez Mihailova 35/IV, P.O. Box 433, 11000 Belgrade, Serbia
Phone: +381 11 2185-437; <http://www.mrs-serbia.org.rs>

Editor: Prof. Dr. Dragan P. Uskoković

Technical editor: Jasmina R. Jevtić

**Typesetting
and prepress:** Dr. Aleksandar Dekanski

Cover page: Nenad Ignjatović

Covers: Images on front & back covers are the property of MRS Serbia

ISBN 978-86-919111-6-4

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MRSS is member of the
Federation of European Materials Societies



Printed in: Biro Konto
Sutorina bb, Igalo – Herceg Novi, Montenegro
Phones: +382-31-670123, 670025, E-mail: bkonto@t-com.me
Circulation: 150 copies. The end of printing: August 2021

P.S.II.15.

Sonochemical synthesis of up-converting β -NaYF₄: Yb, Er nanoparticles

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Up-converting nanoparticles (UCNPs) with unique ability to convert NIR to VIS light (anti-Stokes process) have a wide application in optoelectronics, forensic, security labeling and biomedicine. Over the past few years different methods (like co-precipitation, thermal decomposition, hydro/solvo thermal synthesis, *etc.*) are used for synthesis of β -NaYF₄: Yb/Er phase, mainly from toxic organic precursors. In this work we explore conditions for stabilization of β -NaYF₄: Yb/Er phase in nanoparticles applying sonochemistry synthesis of common inorganic precursor. The XRPD analysis showed that pure β phase is possible to be obtained after 120 min of ultrasonification, while for shorter processing time (30-90min), cubic α -NaYF₄: Yb/Er or orthorhombic YF₃: Yb,Er phase were founded too. The SEM and TEM analysis reveal presence of elongated nanoparticles self-assembled in spindles long up to 500 nm. Evolution of particle morphological and particle composition are analysed and correlated further with intensity of green emission ($^2H_{11/2}, ^4S_{3/2} \rightarrow ^4I_{15/2}$) intensity measured under excitation of 978 nm.