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8th International Congress on Energy Fluxes and Radiation Effects (EFRE 2022)

Abstracts

October 2–8, 2022

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Tomsk 2022

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22nd International Symposium on High-Current Electronics
16th International Conference on Modification of Materials with Particle Beams and Plasma Flows
20th International Conference on Radiation Physics and Chemistry of Condensed Matter
5th International Conference on New Materials and High Technologies

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This book comprises the abstracts of the reports (presentations) for the oral and poster sessions of VIII International Congress on Energy Fluxes and Radiation Effects (EFRE 2022). The Congress will combine four International Conferences regularly hosted in Tomsk: International Symposium on High-Current Electronics, International Conference on Modification of Materials with Particle Beams and Plasma Flows, International Conference on Radiation Physics and Chemistry of Condensed Matter, and International Conference on New Materials and High Technologies. It will be a good platform for researchers to discuss a wide range of scientific, engineering, and technical problems in the fields of pulsed power technologies; ion and electron beams; high power microwaves; plasma and particle beam sources; modification of material properties; pulsed power applications in chemistry, biology, and medicine; physical and chemical nonlinear processes excited in inorganic dielectrics by particle and photon beams; physical principles of radiation-related and additive technologies; self-propagating high-temperature synthesis; and combustion waves in heterogeneous systems, synchrotron and neutron research.

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Уважаемые участники конгресса EFRE-2022!

Несмотря на все сложности обстановки наш традиционный VIII Конгресс состоится в Томске и перед Вами книга абстрактов, включающая все тематики в том числе и новые.

Встреча учёных после длительных постковидных ограничений обещает быть насыщенной новыми идеями и разработками, которые продвинут наше перспективное научное направление «Энергетические потоки и радиационные воздействия».

Четыре мероприятия, которые будут проходить в рамках EFRE-2022: симпозиум по сильноточной электронике, конференции по модификации материалов пучками заряженных частиц и потоками плазмы, конференция по радиационной физике и химии конденсированных сред и конференция по новым материалам и высоким технологиям взаимодополняют и расширяют тематику исследований и разработок в области физики, техники и технологий по мощной импульсной энергетике, пучков заряженных частиц и плазменных потоков, генерации мощных потоков рентгена, микроволн и лазерного излучения, а также взаимодействия этих потоков с веществом в различных агрегатных состояниях, что актуально для разработки принципиально новых и модернизации традиционных технологий, модификации материалов и изделий для передовых отраслей промышленности, биологии, медицины и других применений, в которых так нуждается современное общество.

Важно, что наш Конгресс позволит наладить междисциплинарные связи и цепочки т.к. все мероприятия будут проходить компактно и будет возможность выбирать те из них, которые наиболее соответствуют решаемым учёными, разработчиками и технологами задач, зачастую носящими комплексный характер.

Участие в Конгрессе значительного количества молодых учёных позволит им не только приобрести опыт в популяризации своих достижений, но и установить научные связи на долгие годы вперёд.

Желаем всем участникам Конгресса плодотворной работы и успехов на непростом пути познаний и воплощения своих идей и разработок в реальную жизнь, что чрезвычайно важно в современном мире.

Председатель 22-го Симпозиума
по сильноточной электронике, академик Н.А.Ратахин

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SURFACE NANOSTRUCTURING OF KTP CRYSTAL BY CLUSTER ION BOMBARDMENT*

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The periodic nanostructures on the surface of various materials can lead to unique anisotropy of properties: optical activity, conductivity, adhesion, wetting, etc. [1, 2]. Previously, it was shown that the ion beam bombardment of the surface at oblique angles of incidence can be used as one of the methods of self-organizing nanostructuring [3, 4]. In the comparison with the monomer ion beam, the nonsize-selected beam of cluster ions has high intensity and cluster impact on a target leads to minimum subsurface damage [5–7].

Earlier, we have experimentally studied the influence of angles of cluster incidence on nanostructure formation on the surface of potassium titanyl phosphate (KTP) single crystals [8]. In this work, the features of surface nanostructuring of KTP surface by argon cluster ions with the different energy per cluster atom, ion fluence have been studied. To study the characteristics of the periodic nanostructures, we used the atomic force microscope (AFM) Ntegra Prima HD. Figure 1 shows the AFM images of KTP surface before and after cluster ion bombardment with the kinetic cluster energy E = 6.5 keV and mean cluster size N_{mean} = 600 atoms at the scan sizes of 2×2 μm^2 with a resolution of 1024×1024 pixels.

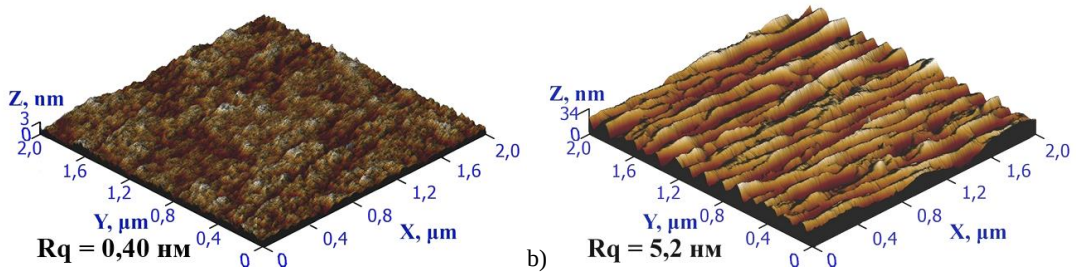

Fig.1. 3D AFM images of the KTP surface: a) as-prepared, b) after the cluster ion bombardment.

The characteristics of self-organizing nanostructures, the etching rates and sputtering yields for KTP single crystals in a wide range of energy per atom in the argon cluster (E/N_{mean} = 10–110 eV/atom) have been determined. A comparison has been made of the nanostructures formed at the same mass fluxes, but at different parameters of cluster ions. The dynamics of changes in the parameters of nanostructures depending on the ion fluence are demonstrated.

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