Role of substrate temperature and laser fluence on cesium lead bromide thin films by Pulsed Laser Deposition

Konstantinos Maitianos[1], Stefania Milanese[2,3], Ilias Zervakis[4], Giovanni Morello[3,5], Marco Anni[2], Maria Luisa de Giorgi [2], Argyro Klini[6,*]

[1]Department of Physics, University of Crete, GR 700 13, Heraklion, Crete, Greece
[2] Dipartimento di Matematica e Fisica "Ennio De Giorgi", Università del Salento, 73100 Lecce, Italy
[3] CNR IMM – Institute for Microelectronics and Microsystems – Unit of Lecce, Via per Monteroni, 73100, Lecce, Italy
[4]Chemical Engennering Department, University of Patras, GR 265 04, Patras, Greece
[5] Center for Biomolecular Nanotechnologies @UNILE, Istituto Italiano di Tecnologia, Via Bersanti, I – 73010, Arnesano (LE), Italy
[6]IESL/FORTH, N. Plastira 100, GR 700 13, Heraklion, Crete, Greece
[*]Corresponding author email: *klini@iesl.forth.gr

Inorganic halide perovskites, such as $CsPbBr_3$, have extensively been investigated the recent years, as an emerging new generation class of materials.
Owing to their novel optoelectronic properties [1] such as high carrier mobility, excellent photoluminescence quantum yield and tunable band gap, they have gained enormous interest for their potential use in a wide range of applications, such as in light-emitting diodes [2], photodetectors, photocatalysis [3] and more recently in sensing technologies [4].
Focusing on their fabrication, the synthesis of halide perovskite nanocrystals based on solution methods [5] is widely reported, the growth of the material in the form of thin film is much less explored. In this work we report on the fabrication and characterization of cesium lead bromide thin films by applying a well-established physical vapor deposition technique, Pulsed Laser Deposition (PLD) [5].

As laser source, a KrF Excimer laser was used (λ=248 nm, τ = 15 ns). The ablated material was collected on silicon and quartz substrates. Particular emphasis was placed on the investigation of the effect of substrate temperature (ranging from room temperature to 350 °C), exploring two different-laser energy densities (0.6 and 1.2 J/cm^2), on films properties. The as-synthesized cesium lead bromide films, were fully characterized in terms of their morphological, structural and optical properties by Field Emission Scanning Electron Microscopy (FE-SEM), profilometry, X-Ray Diffraction (XRD), UV-Vis and Photoluminescence (PL) Spectroscopy.

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