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ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

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Τίτλος

«Fabrication, properties and applications of all-inorganic Lead Halide Nanostructures»

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ABSTRACT

Over the past few years all-inorganic lead halide perovskite naostractures have been intensively studied due to their attractive optical and electronic properties. In general, perovskite materials are sensitive to a variety of environmental factors, however, under certain conditions, reversed changes in perovskite's electrical behavior can be observed, indicating the great potential for sensing applications. For this purpose, well-formed and distorted all-inorganic lead halide nanocubes were fabricated by facile, simple and cost-effective methods and were investigated as ozone and hydrogen sensing elements. In the case of ozone sensing, both materials were self-powered and operated at room temperature. The sensing measurements revealed that they exhibit high sensing ability in a wide range of ozone concentrations, fast response and remarkable repeatability. In particular, the sensitivity of well-formed nanocubes was 54% at 187 ppb while for

distorted nanocubes was 13% at 4 ppb, which were the highest reported values among other sensing elements operating at room temperature to date.

Additionally, distorted CsPbBr3 nanocubes were further investigated as self-powered hydrogen sensing element. The sensor operated at room temperature, exhibited high sensitivity (1.5% at 1 ppm) and fast response. Moreover, the unaltered morphology and stoichiometry of the nanocubes after the hydrogen treatment revealed the stability of the sensor. Those promising properties as well as the stability of the sensors after the ozone and hydrogen treatments provide new opportunities in gas sensing technology.