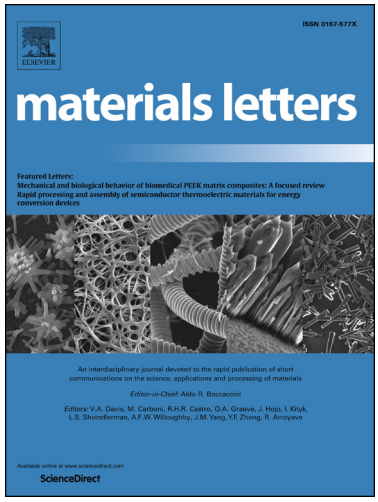

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Localized surface plasmon resonance tuning via nanostructured gradient Ag surfaces

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Abstract

Gradient surfaces, i.e. surfaces whose properties change gradually along the sample length, receive increasing attention as they facilitate optimization of surface properties for particular applications. In this study we present vacuum-based strategy for fabrication of irregular silver nanoparticle arrays with gradient optical properties. This approach is based on the magnetron sputtering of Ag performed at low pressure in argon atmosphere. The gradient character of deposited arrays is achieved by use of a movable mask that is introduced in the vicinity of the substrate. It is shown that this technique enables to tailor the course of the gradient of localized surface plasmon resonance (LPSR) either by the speed of the mask or by additional deposition of silver on the top of surface pre-seeded by the gradient nanoparticle arrays.

Keywords: sputtering; nanoparticles; localized surface plasmon resonance; gradient surfaces

1 Introduction

Silver nanoparticles (NPs) with dimensions smaller than the wavelength of light received high attention in the last decades. The interest in Ag NPs is primarily due to their localized surface plasmon resonance (LSPR) that typically occurs in the visible part of spectra. This makes silver nanoparticles highly valuable for a wide range of applications such as for instance photovoltaics [1,2] or biosensing [3-6]. One of common strategies used for production of materials for these applications is deposition of Ag nanoparticles onto a supporting substrate by means of magnetron sputtering [7,9]. In this case isolated

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