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Optically induced spin transport in semi-metal heterostructures

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It has been reported that anisotropic helicity dependent photocurrent flows when circularly polarized light is irradiated from an oblique incidence to samples with spin-momentum locked bands. This effect, known as the circular photogalvanic effect (CPGE), has been studied in semiconductor heterostructures[1] and topological insulators[2]. Recently we reported helicity dependent photocurrent due to the CPGE in (semi)metallic heterostructures under illumination of visible light: the results indicate the presence of spin-momentum locked bands of Rashba type at the interface[3]. In particular, we find significant helicity dependent photocurrent in Cu/Bi bilayers.

We have extended studies on the generation of helicity dependent photocurrent in (semi)metallic heterostructures. The photocurrents induced by circularly polarized light under front and back illumination are studied to separate bulk and interface contributions. Together with the film thickness dependence, we discuss the origin of helicity dependent photocurrent in (semi)metallic heterostructures.

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