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Photo-excited hot electrons from conductive films forming heterojunctions

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Metals have been known to have losses in optical range, because they absorb light and generate hot electrons. Such photo-excited hot electrons can be detected as photocurrent by forming ametal-insulator-metal (MIM) heterojunctions. While photocurrent generation at MIM junctions have been studied for decades, here we provide two new directions which could extend relevant works on MIM heterojunctions. First, we experimentally show that metal layers can be replaced with conductive oxides, which enable all oxide photodetector without p-n junctions. Second aspect is about the way of illumination. In most of the cases, MIM junctions have been illuminated by light propagating in free space. In contrast, we show that evanescent fields can also excite hot electrons. As a proof of concept, we demonstrate an MIM photodetector to monitor the evanescent field of the guided light through an optical waveguide.

Biography

Satoshi Ishii has obtained his PhD from Purdue University in 2012. After working as a JSPS Postdoctoral Fellow for Research Abroad at Purdue University and a researcher at the National Institute of Information and Communications, currently he is a MANA Scientist at the National Institute for Materials Science. His main research area is nanophotonics including plasmonics and metamaterials. He is the recipient of the Funai Research Incentive Awards in 2014 and the 27th High Technology Award for Originality in 2013.

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