Contribution ID: 202

Type: Parallel Session Presentation

## Concept of projection-type 3D spin-resolving electron detector with spatial resolution and new type of polarized electron source

Thursday, 21 October 2021 09:50 (20 minutes)

The concept of an imaging-type 3D spin detector, based on the combination of spin-exchange interactions in the ferromagnetic film and spin selectivity of the electron–photon conversion effect in a semiconductor heterostructure, is proposed and demonstrated on a model system. This novel multichannel concept is based on the idea of direct transfer of a 2D spin-polarized electron distribution to image cathodoluminescence (CL) [1]. The detector is a hybrid structure consisting of a thin magnetic layer deposited on a semiconductor structure allowing measurement of the spatial and polarization-dependent CL intensity from injected spin-polarized free electrons. The ferromagnetic/ semiconductor detector has the potential for realizing multichannel 3D vectorial reconstruction of spin polarization in momentum microscope and angle-resolved photoelectron spectroscopy systems.

A new type of spin polarized electron source based on the alkali antimonides photocathodes are discovered. It is shown that the degree of polarization is comparable to that observed for GaAs photocathodes.

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Session Classification: Polarized Sources and Targets

Track Classification: Parallel Sessions: Polarized Sources and Targets