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Enhancement of the transverse non-reciprocal magneto-optical effect

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The origin and properties of the transverse non-reciprocal magneto-optical (nMO) effect were studied. The transverse nMO effect occurs in the case when light propagates perpendicularly to the magnetic field. It was demonstrated that light can experience the transverse nMO effect only when it propagates in the vicinity of a boundary between two materials and the optical field at least in one material is evanescent. The transverse nMO effect is pronounced in the cases of surface plasmons and waveguiding modes. The magnitude of the transverse nMO effect is comparable to or greater than the magnitude of the longitudinal nMO effect. In the case of surface plasmons propagating at a boundary between the transition metal and the dielectric it is possible to magnify the transverse nMO effect and the magneto-optical figure-of-merit may increase from a few percents to above 100%. The scalar dispersion relation, which describes the transverse MO effect in cases of waveguide modes and surface plasmons propagating in a multilayer MO slab, was derived.

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