EMF generation by propagating magnetostatic surface waves in integrated thin-film Pt/YIG structure

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Magnetostatic surface waves (MSSW) propagation and electromotive force (EMF) generation effects in 14.6 μm-thick yttrium iron garnet (YIG) film covered by 8 nm-thick Pt layer was studied. It was found that MSSW dispersion $k = k(f)$ and transmission $S_{21}(f)$ characteristics in YIG/Pt structure are very similar to that of free YIG film. For YIG/Pt structure, we show that EMF (U) demonstrates non-monotonous frequency dependence $U(f)$ and is characterized by two peaks $U_{1,2}$. The first one (U_1) is located near the short-wavelength ($k \to \infty$) cut-off frequency of the MSSW spectra and can be attributed to MSSW drag of electrons in YIG/Pt structure. The second one (U_2) is located near the long-wavelength ($k \to 0$) cut-off frequency of the MSSW spectra and can be attributed to the inverse spin Hall effect due to the spin pumping.

Keywords: magnetostatic surface waves, Pt/YIG structure, electromotive force generation effects.

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