Abstract Submitted
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Current-induced spin polarization in transition metals and Bi/Ag bilayers observed by spin-polarized positron beam[1] HONGJUN ZHANG, SHUNYA YAMAMOTO, YUKI FUKAYA, MASAKI MAEKAWA, HUI LI, ATSUO KAWASUSO, JAEA, TAKESHI SEKI, EIJI SAITOH, KOKI TAKANASHI, Tohoku, JAEA TEAM, TOHOKU TEAM — Current-induced spin polarization (CISP) on the outermost surfaces of Au, Cu, Pt, Pd, Ta, and W films were studied by spin-polarized positron beam (SPPB). The Au and Cu surfaces showed no significant CISP. In contrast, the Pt, Pd, Ta, and W films exhibited large CISP ($3 \sim 15\%$ per charge current of 10^5 A/cm^2) and the CISP of Ta and W were opposite to those of Pt and Pd. The sign of the CISP obeys the same rule in spin Hall effect suggesting that the spin-orbit coupling is mainly responsible for the CISP.[2] The outermost spin poalrization of Bi/Ag/Al_2O_3 and Ag/Bi/Al_2O_3 (charge currents directly connected to Ag layers) were probed by SPPB. The opposite outermost spin polarization of Bi/Ag/Al_2O_3 and Ag/Bi/Al_2O_3 clarified the charge-to-spin conversion in Bi/Ag bilayers. Nevertheless, the magnitudes of the outermost spin polarization of Bi(0.3∼5)/Ag(25)/Al_2O_3 (numbers in parentheses denote thickness in nm) and Ag(25∼500)/Bi(8)/Al_2O_3 decrease exponentially with increasing Bi thickness and Ag thickness, respectively. This provides probably the first direct evidence for spin diffusion mechanism.

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[2]H. J. Zhang *et al.*, Scientific Reports **4**, 4844 (2014).

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