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**Infrared Hall effect measurements in iron pnictide superconductors**[1] ALOK MUKHERJEE, M. MURAT ARIK, HUI XING, PAYAM TAHERI, HAO ZENG, JOHN CERNE, State Univ of NY - Buffalo, HIKARU SATO, HIDENORI HIRAMATSU, HIDEO HOSONO, Tokyo Institute of Technology, Yokohama, Japan — Recent longitudinal conductivity $\sigma_{xx}(\omega)$ measurements on Ba122 superconductors have found many rich features including infrared pseudogap phase, related to spin density waves. In addition, iron superconductors exhibit unusual DC Hall conductivity. We expand the range of study by measuring the frequency-dependent Hall conductivity $\sigma_{xy}(\omega)$. We measure the polarization sensitive complex Faraday angle $\theta_{F,}$ which is proportional to $\sigma_{xy}(\omega)$. The complex $\theta_{\rm F}$ in Ba122 superconducting films and reference iron films are measured as a function of energy (0.1- 3 eV), temperature (10-300 K) and magnetic field ($B$ = 0-7T). Surprisingly, the infrared (0.1-0.4 eV) $\theta_F$ in Ba122 films is consistent with a soft ferromagnet having a step like feature near $B$ =0, followed by a linear dependence at higher $B$. The step near $B$ =0 ($\Delta\theta_F$) is due to the magnetization-dependent anomalous Hall effect of iron impurities, while the linear behavior ($\theta_{F,slope}$) at higher $B$ (after magnetization in Fe gets saturated) reflects the ordinary Hall response of Ba122. The Fe reference films show little temperature dependence in both $\Delta\theta_F$ and $\theta_{F,slope}$ at any energy, which is consistent with its high Curie temperature of $\sim$ 1000 K. On the other hand $\theta_{F,slope}$ for the Ba122 films shows strong, non-monotonic temperature dependence with a peak near 50 K

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