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Development of a new set-up for total cross section measurement in the cold electron collision MANABU KUROKAWA, MASASHI KITAJIMA, TAKESHI ODAGIRI, Department of Chemistry, Tokyo Institute of Technology, HIDETOSHI KATO, MASAMITSU HOSHINO, HIROSHI TANAKA, Department of Physics, Sophia University, KENJI ITO, Photon Factory, Institute of Materials Structure Science — Collisions of electrons with atoms or molecules at very low-energy, so called “cold electron collision,” show unique quantum effects due to the very long de Broglie wavelength of an electron with thermal kinetic energy which becomes much longer than the typical size of the target particles. We present a new experimental set-up utilizing threshold photoelectrons produced from the photoionization at the threshold of rare gas atom as an electron source for the cold electron collision experiment. Since the kinetic energies of the threshold electrons are almost zero, the electron beam of very small emittance can be obtained. Therefore, a low-energy electron beam is achievable. We also present the total cross sections of electron scattering from Ar, Kr and Xe measured with the present set-up over the energy range 14 meV to 20 eV. In the present measurements, the resonant structures due to the Feshbach resonances of Ar, Kr and Xe were clearly observed on each of the total cross section curves.

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