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RD on Ba-Tagging for nEXO Using Electron Microscopy MICKEY CHIU, Brookhaven National Laboratory, NEXO COLLABORATION — nEXO is a proposed 5 ton LXe neutrino-less double beta decay ($0\nu\beta\beta$) experiment to discover whether neutrinos are Majorana particles. nEXO is one of the most sensitive proposed ton-scale $0\nu\beta\beta$ experiments. With a projected half-life sensitivity of about 10^{28} years, it can cover the entire ν inverted mass hierarchy. This limit is partly due to radioactive backgrounds around the $0\nu\beta\beta$ Q-value which mimic a ^{136}Xe decay. However, ^{136}Xe decays into ^{136}Ba++, and identification of the remnant Ba ion (ie, Ba-tagging) would allow nEXO to reject all background events. This would increase the sensitivity by a factor of 4, and allow nEXO to probe well into the normal mass hierarchy. We present results using Scanning Transmission Electron Microscopes (STEM) to image and robustly identify single Ba atoms using Energy-Dispersive X-ray Spectroscopy (EDXS) and Electron Energy Loss Spectrosopy (EELS). This technique could provide a path for Ba-tagging in nEXO. We'll discuss the challenges that remain in developing the entire Ba-tagging chain, from extraction of the single Ba ion out of the 5 tons of LXe to the end-stage identification. We'll also provide a survey of the other promising Ba-tagging techniques being developed for nEXO.

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