Abstract： The trap levels of Al_2O_3 nano-powder doped LDPE with different Al_2O_3 contents are investigated by PSD technique. The variation of trap depth in the doped LDPE can be qualitatively estimated by PSD spectra in continuous scanning method, and the distribution of trap levels in the samples can be quantitatively described in step scanning method. It is indicated that the trap levels of LDPE can be evidently deepened by Al_2O_3 nano-powder doping with the content more than 0.1 wt%. According to the relative reports on the effect of nano-powder doping to space charge injection, it is considered that the suppression of space charge is probably correlated to the deeper trap levels in Al_2O_3 nano-powder doped LDPE.