X24b Lyα Emitters with Very Large Lyα Equivalent Widths, EW$_0$(Lyα) $\simeq 200-400$Å, at $z \sim 2$

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We present physical properties of spectroscopically confirmed Lyα emitters (LAEs) with very large rest-frame Lyα equivalent widths EW$_0$(Lyα). Although the definition of large EW$_0$(Lyα) LAEs is usually difficult due to limited statistical and systematic uncertainties, we identify six LAEs selected from ~ 3000 LAEs at $z \sim 2$ with reliable measurements of EW$_0$ (Lyα) $\simeq 200 - 400$ Å given by careful continuum determinations with our deep photometric and spectroscopic data. These large EW$_0$(Lyα) LAEs do not have signatures of AGN, but notably small stellar masses of $M_* = 10^{7-8}$ $M_\odot$ and high specific star-formation rates of ~ 100 Gyr^{-1}. These LAEs are characterized by the median values of L(Lyα) $= 3.7 \times 10^{42}$ erg s^{-1} and $M_{\rm UV} = -18.0$ as well as the blue UV continuum slope of $\beta = -2.5 \pm 0.2$ and the low dust extinction $E(B-V)_* = 0.02^{+0.04}_{-0.02}$, which indicate a high median Lyα escape fraction of $f_{\rm esc}^{\rm Ly\alpha} = 0.68 \pm 0.30$. This large $f_{\rm esc}^{\rm Ly\alpha}$ value is explained by the low HI column density in the ISM that is consistent with FWHM of the Lyα line, FWHM(Lyα) $= 212 \pm 32$ km s^{-1}, significantly narrower than those of small EW$_0$(Lyα) LAEs. Based on the stellar evolution models, our observational constraints of the large EW$_0$ (Lyα) and the small β imply that at least a half of our large EW$_0$(Lyα) LAEs would have young stellar ages of $\lesssim 20$ Myr and very low metallicities of $Z < 0.02 Z_\odot$.