abstract The small grain sizes produced by Type II supernova (SN II) models in young, metal-poor galaxies make the appearance of their infrared (IR) spectral energy distribution (SED) quite different from that of nearby, older galaxies. To study this effect, we have developed a model for the evolution of dust content and the IR SED of low-metallicity, extremely young galaxies based on hirashita02. We find that, even in the intense ultraviolet (UV) radiation field of very young galaxies, small silicate grains are subject to stochastic heating resulting in a broad temperature distribution and substantial MIR continuum emission. Larger carbonaceous grains are in thermal equilibrium at $T \simeq 50 - 100$ K, and they also contribute to the MIR. We present the evolution of SEDs and IR extinction of very young, low-metallicity galaxies. The IR extinction curve is also shown. In the first few Myrs, the emission peaks at $\lambda \sim 30 - 50 \mu m$; at later times dust self-absorption decreases the apparent grain temperatures, shifting the bulk of the emission into the submillimetre band. We successfully apply the model to the IR SED of SBS 0335$-052$, a low metallicity ($1/41 Z_\odot$) dwarf galaxy with an unusually strong MIR flux. We find the SED, optical properties and extinction of the star forming region to be consistent with a very young ($age \simeq 6.5 \times 10^6$ yr) and compact ($radius \simeq 20$ pc) starburst. We also predict the SED of another extremely low-metallicity galaxy, I Zw 18, for future observational tests. We estimate the FIR luminosity of I Zw 18 to be low as $L_{\text{FIR}} \sim 10^7 - 10^8 L_\odot$, depending on the uncertainty of dust mass. Some prospects for future observations are discussed.
Extinction $A_\lambda$ [mag]

$\lambda$ [\mu m]

$t=1.0\times10^8$ [yr]
$t=3.2\times10^7$ [yr]
$t=1.8\times10^7$ [yr]
$t=1.0\times10^7$ [yr]
$t=5.6\times10^6$ [yr]
$t=3.2\times10^6$ [yr]

$r_{SF}=100$ [pc]
I Zw 18

Flux density $S_{\nu}$ [$\mu$Jy]

Wavelength $\lambda$ [$\mu$m]

Model $r_{\text{SF}} = 100$ [pc]

- $4.2 \times 10^7$ [yr]
- $1.0 \times 10^7$ [yr]