Three-dimensional computations on the basis of the index-function lattice Boltzmann method are performed to simulate the process of multiple droplets impinging and coalescing into a line pattern on a solid substrate. The employed calculation model is validated by theoretical calculated values and experimental data from the literature. The influences of the equilibrium contact angle, droplet spacing and impinging velocity on the droplets impingement and coalescence behaviours are investigated. Numerical results demonstrate the width of the formed line depends significantly on the equilibrium contact angle and droplet spacing. The droplet spacing plays a significant role in controlling the coalescence moment of multiple droplets. The resolution of the printed pattern can be slightly increased with increase in impinging velocity.