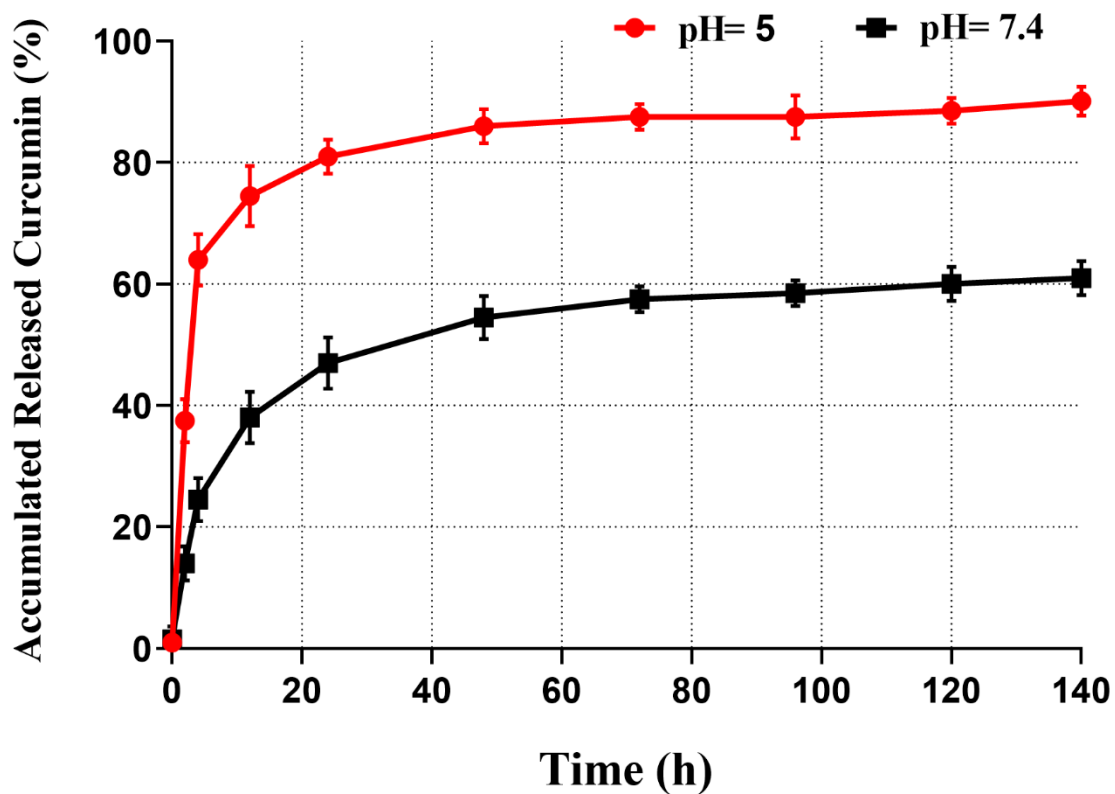
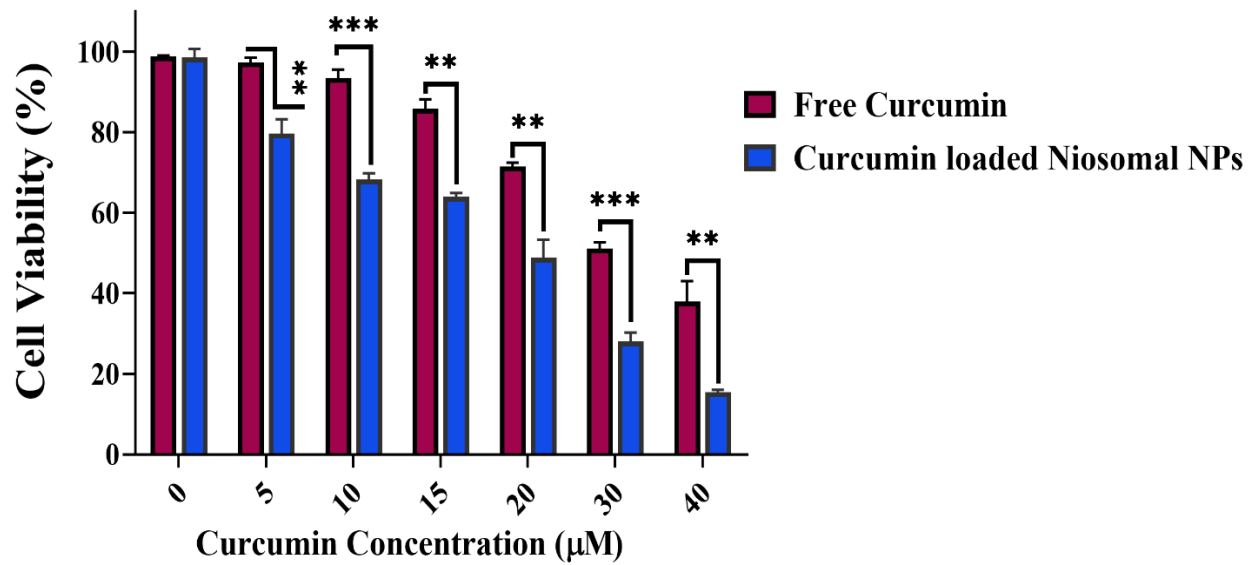


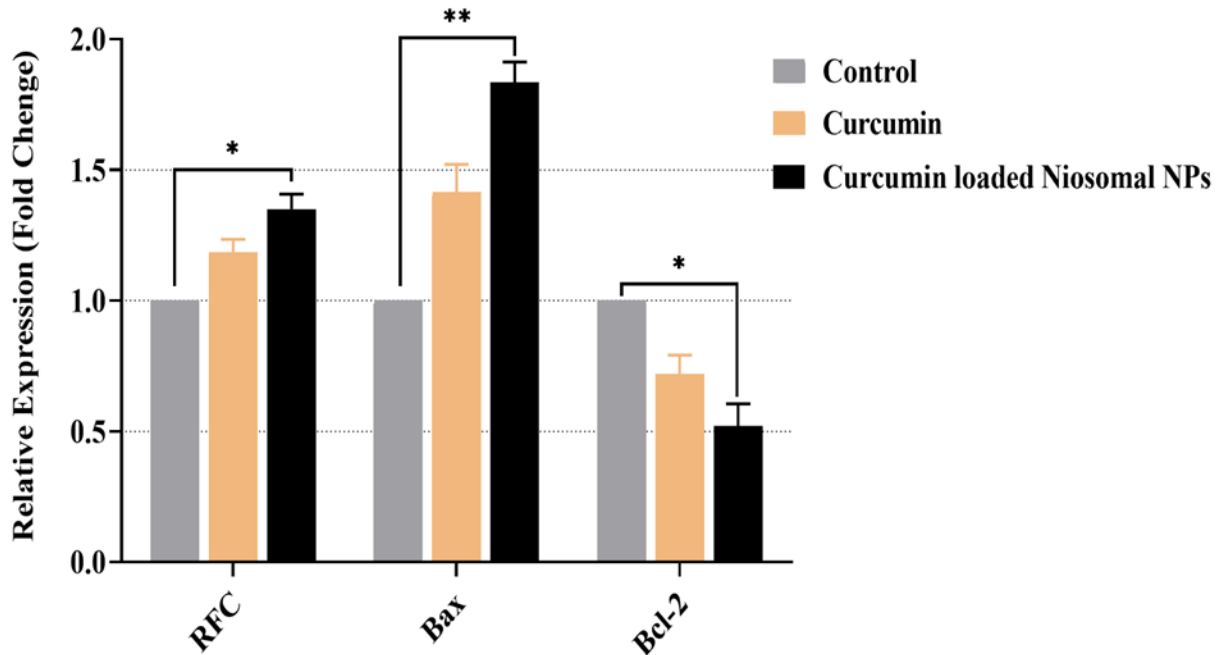
Supplementary Figure 6) Field emission scanning electron microscopy (FE-SEM) of curcumin loaded niosome NPs. The morphology of nanoparticles showed spherical with smooth surfaces.



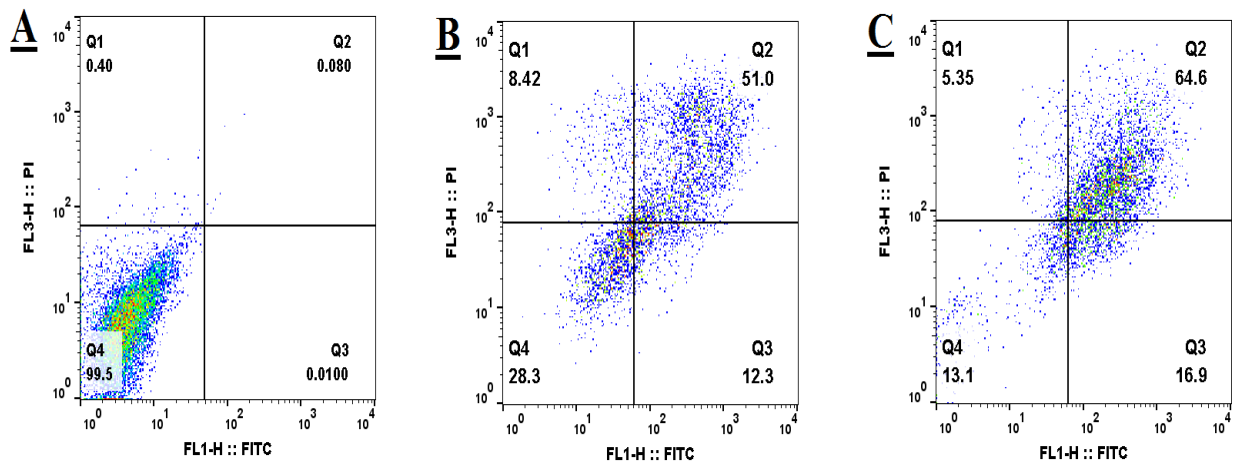
Supplementary Figure 7) Drug release patterns of curcumin from niosome NPs in PBS at PH 5 and 7.4. The rate of drug release was burst in the first 24 hours, but then this rate was slowed. the release rate of curcumin in acidic conditions (pH~ 5) is faster than in a neutral environment (pH~7.4). The maximum release of curcumin was 60% at pH 7.4 and 90% at acidic pH 5.



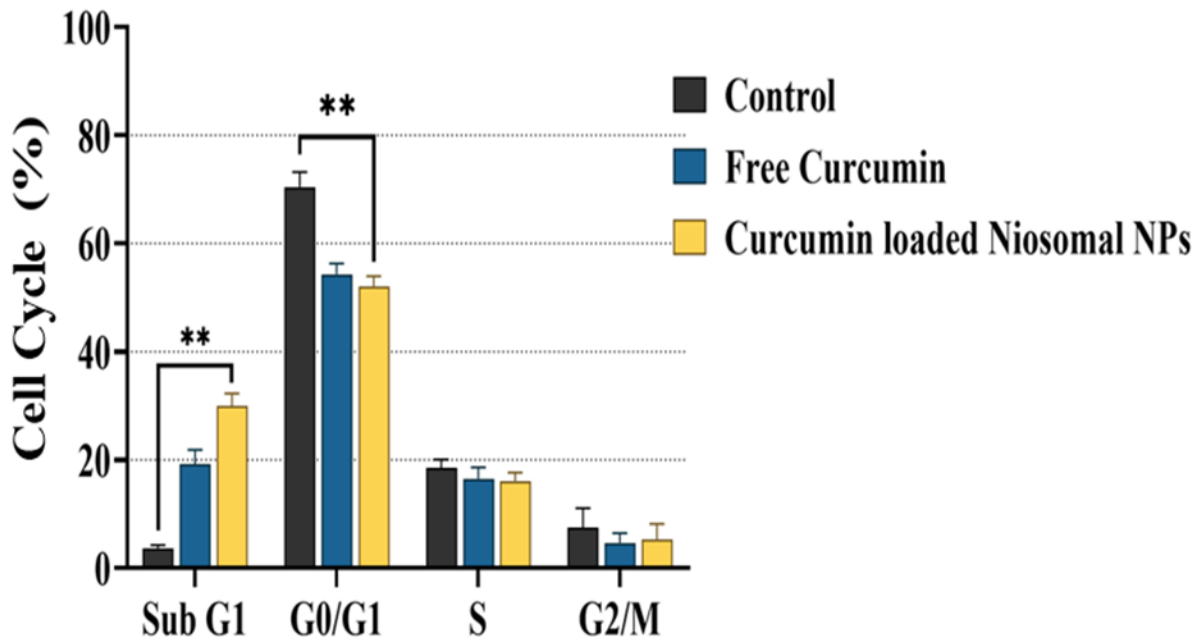
Supplementary Figure 8) According to the MTT results, free curcumin and curcumin-loaded niosome nanoparticles (NPs) were highly effective against MDA-MB-231 cells after 48 hours of treatment. The viability rate of the cancer cell line significantly decreased upon exposure to both types of curcumin, with curcumin-loaded niosome showing greater effectiveness than free curcumin. (p value * < 0.05, ** < 0.01, and *** < 0.001).



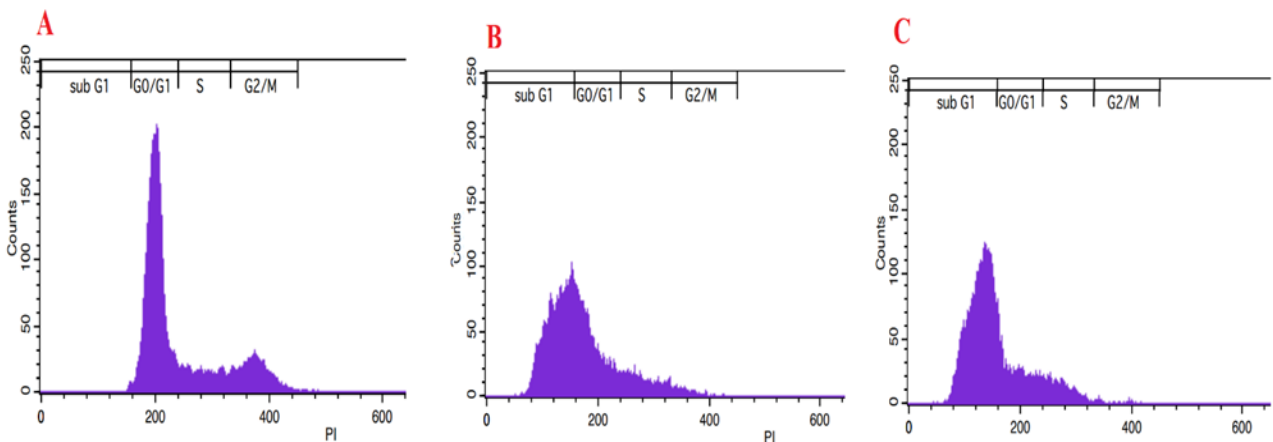
Supplementary Figure 9) The gene expression analysis showed that treatment with cur-nio NPs increased the expression of RFC and BAX genes in MDA-MB-231 cells, while the expression of BCL-2 gene decreased significantly compared to the control group (* < 0.05, ** < 0.01, and *** < 0.001).



Supplementary Figure 10) Apoptosis results after treatment with free curcumin and cur-nio. A) control B) free Curcumin C) cur loaded in niosome. The results show that the apoptosis rate of treated cells with free curcumin and curcumin loaded in niosome are higher in the control group. In A, 99% of cells are alive. In B, 12% is in the early apoptosis, and 51% is in the late apoptosis. In C, 17% of the cells are in early apoptosis, and 64% are in late apoptosis.



Supplementary Figure 11) Percentage diagram of cell cycle phases. The increase of cell population has showed in the sub G1 phase with treating cells by cur-nio nanoparticles and the stopping of the cycle process in the G2/M phase have occurred.



Supplementary Figure 12) Cell cycle analysis of MDA-MB-231 cells exposed with free cur and cur-nio. Cell cycle arrested in G2/M phase and population of cells are shown in Sub-G1 phase which it indicates the apoptosis of cancer cells.