Article

Preparation and Preliminary Analysis of Several Nanoformulations Based on Plant Extracts and Biodegradable Polymers as a Possible Application for Chronic Venous Disease Therapy

Supplementary Materials

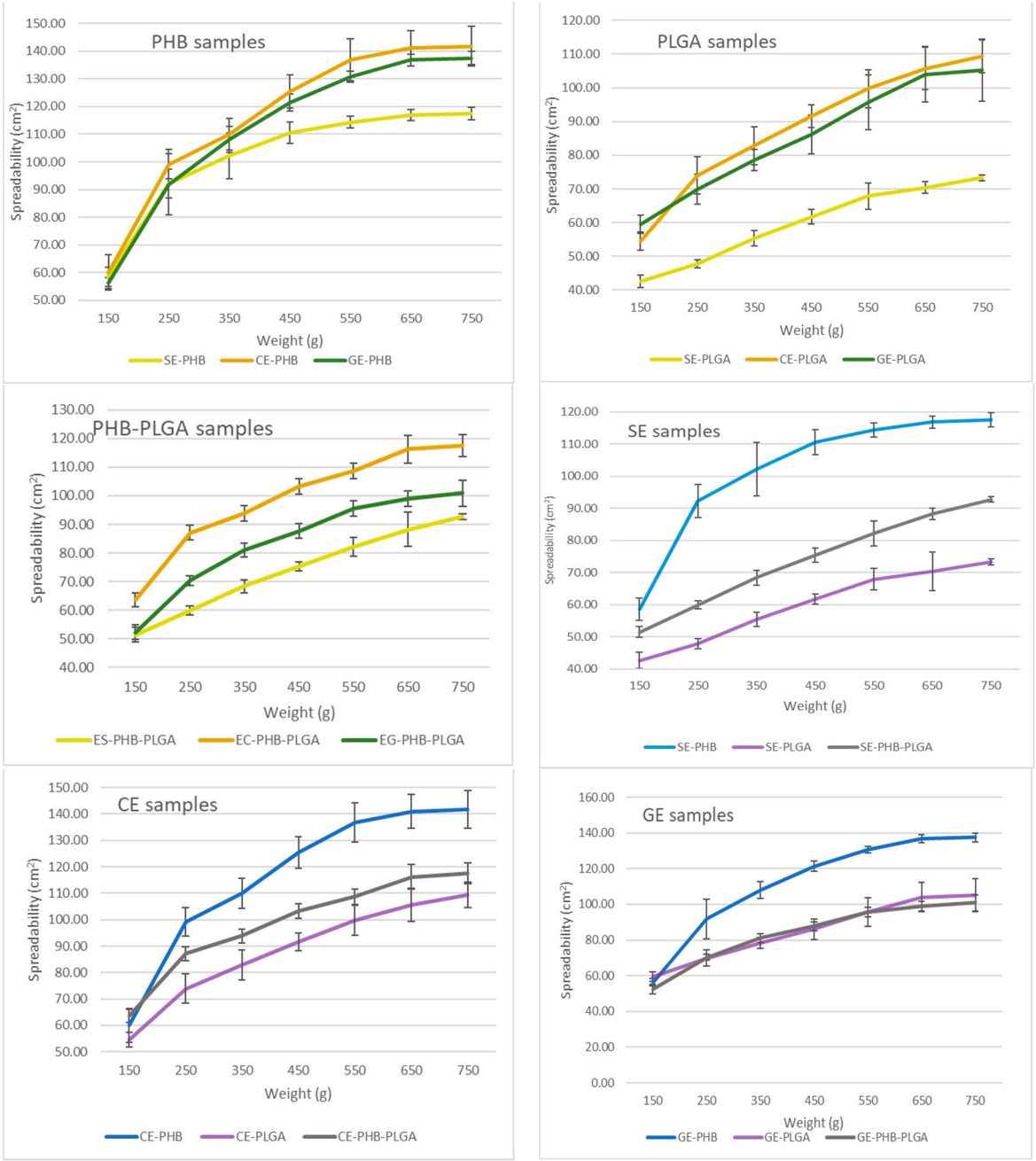


Figure S1. Spreadability variation depending on type of extract and biopolymer. SE = *Sophorae flos* extract, GE = *Ginkgo bilobae folium* extract; CE = *Calendulae flos* extract; PHB = polyhydroxybutyrate, PLGA = polylactic-co-glycolic acid.

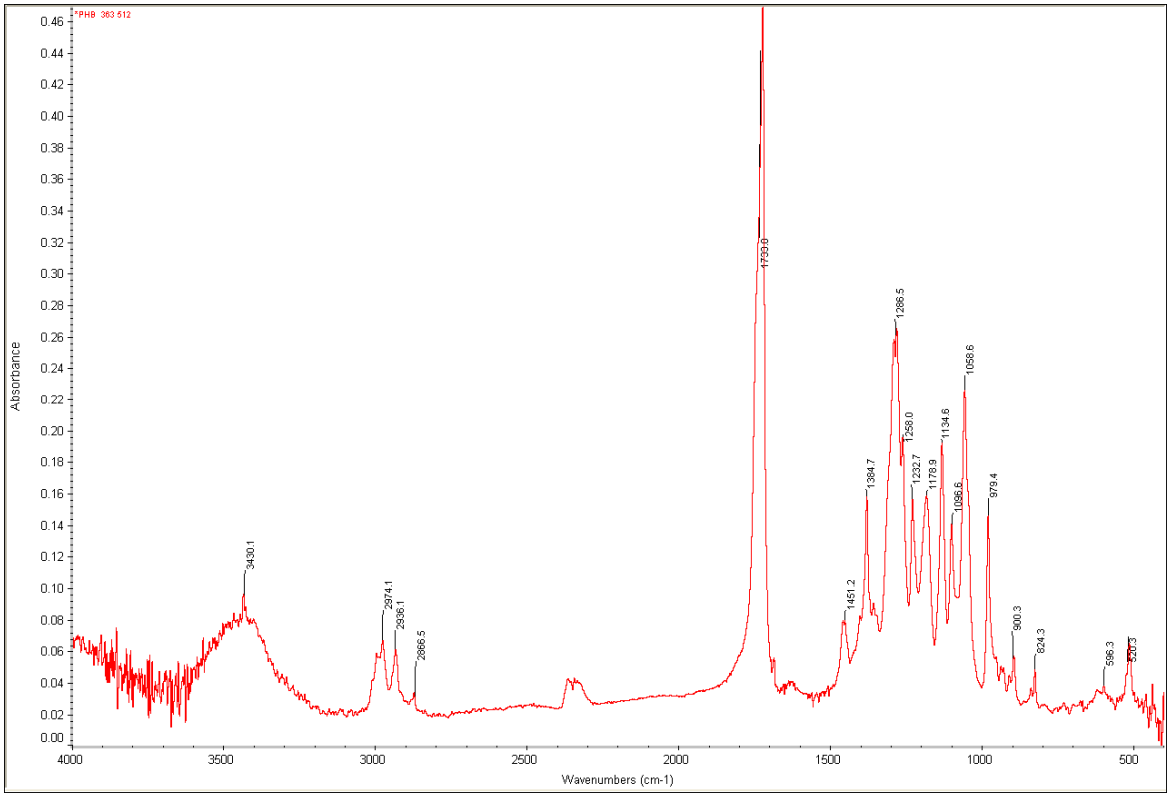


Figure S2. ATR-FTIR spectrum of polyhydroxybutyrate (PHB).

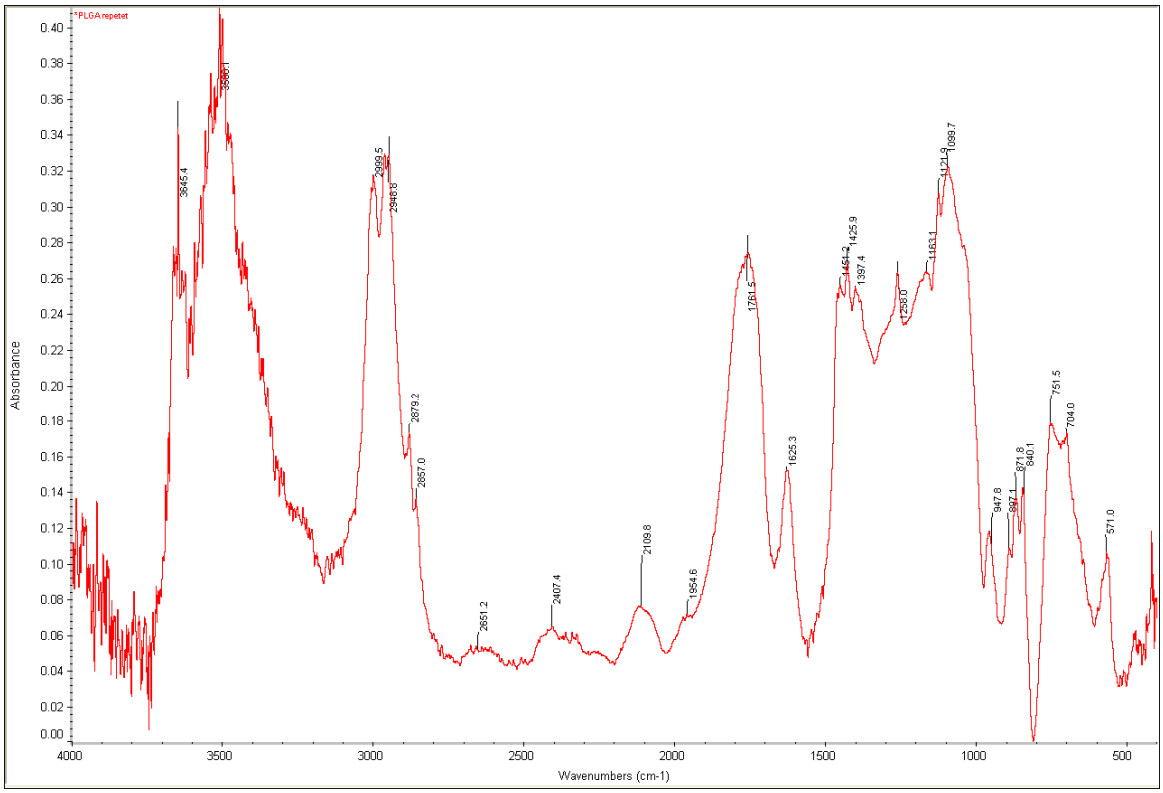


Figure S3. ATR-FTIR spectrum of polylactic-co-glycolic acid (PLGA).

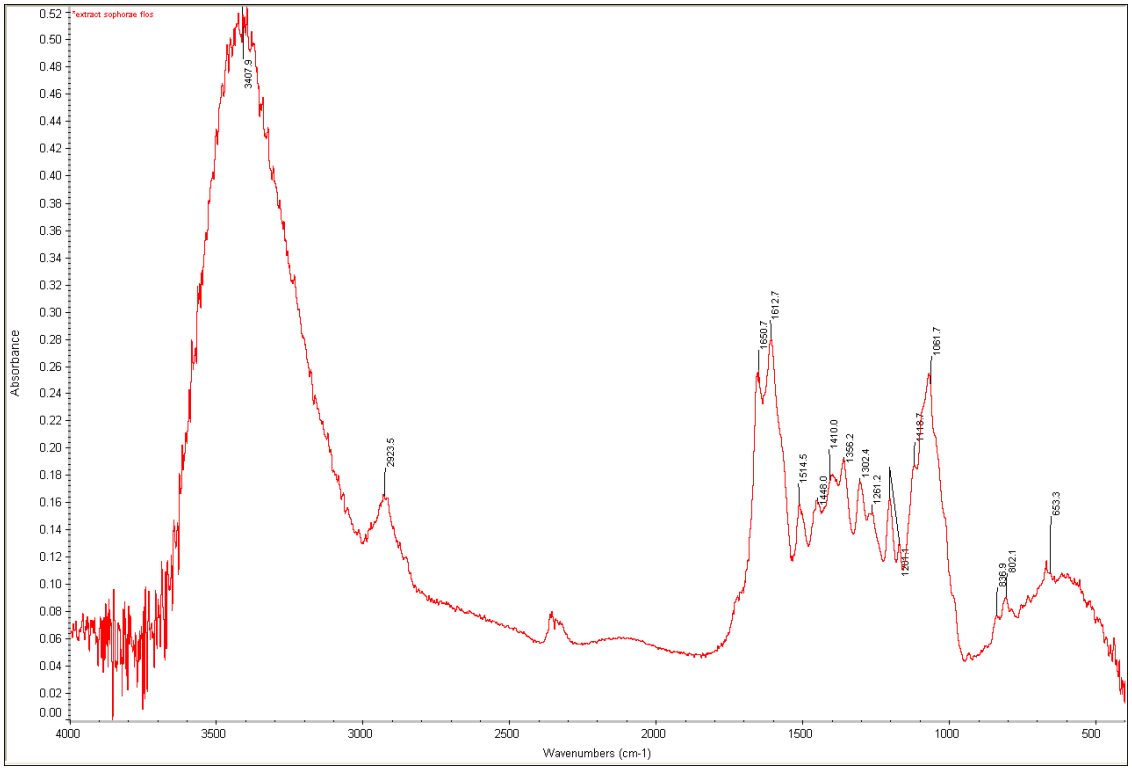


Figure S4. ATR-FTIR spectrum of *Sophorae flos* extract (SE).

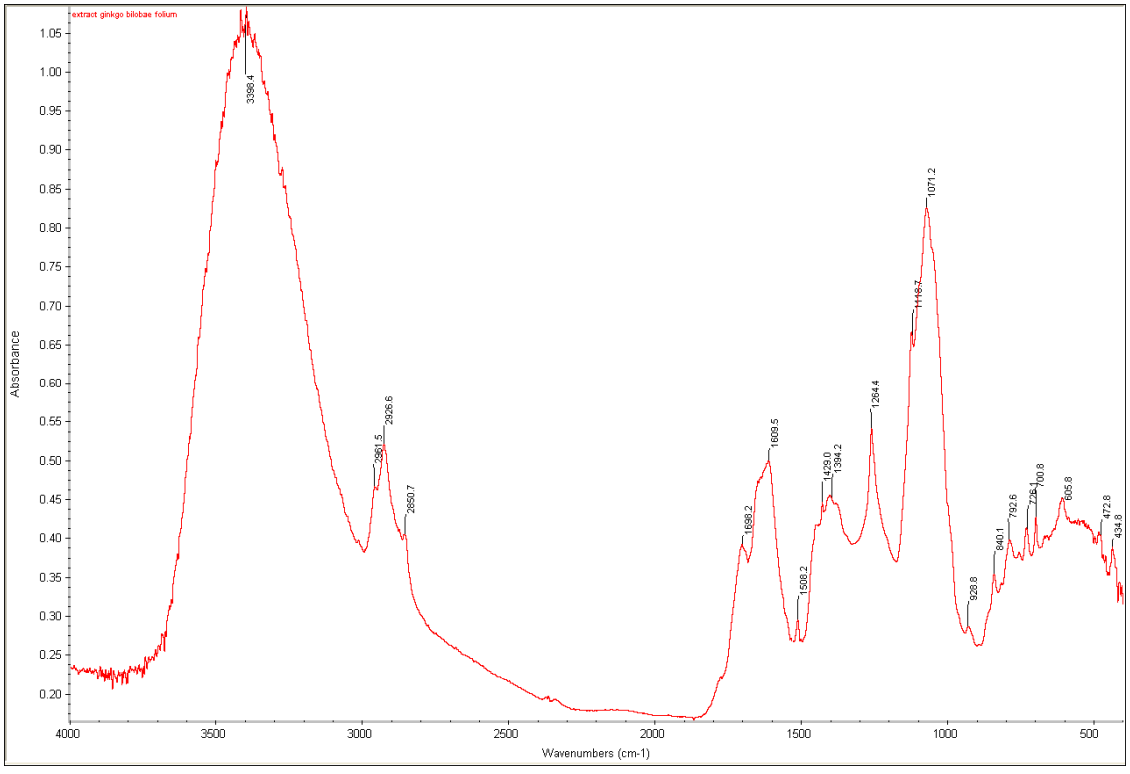


Figure S5. ATR-FTIR spectrum of *Ginkgo bilobae folium* extract (GE).

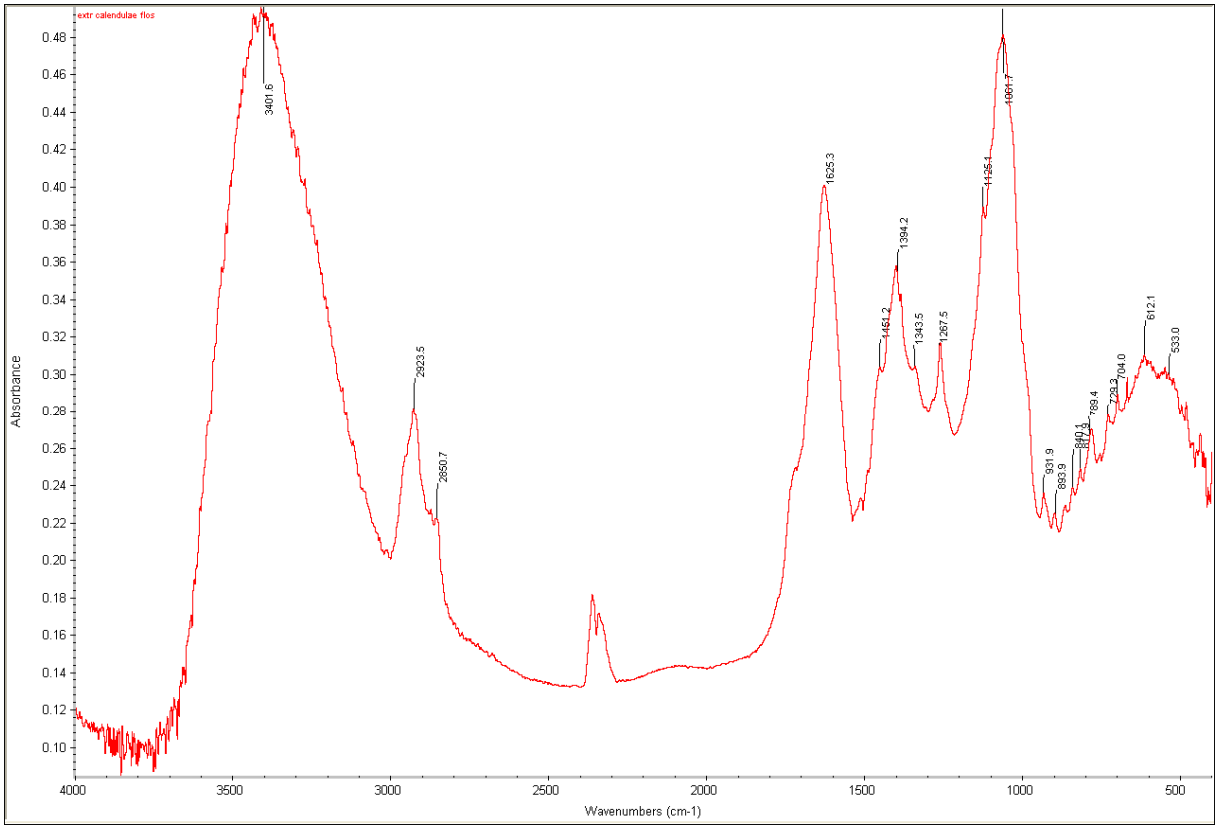


Figure S6. ATR-FTIR spectrum of *Calendulae flos* extract (CE).

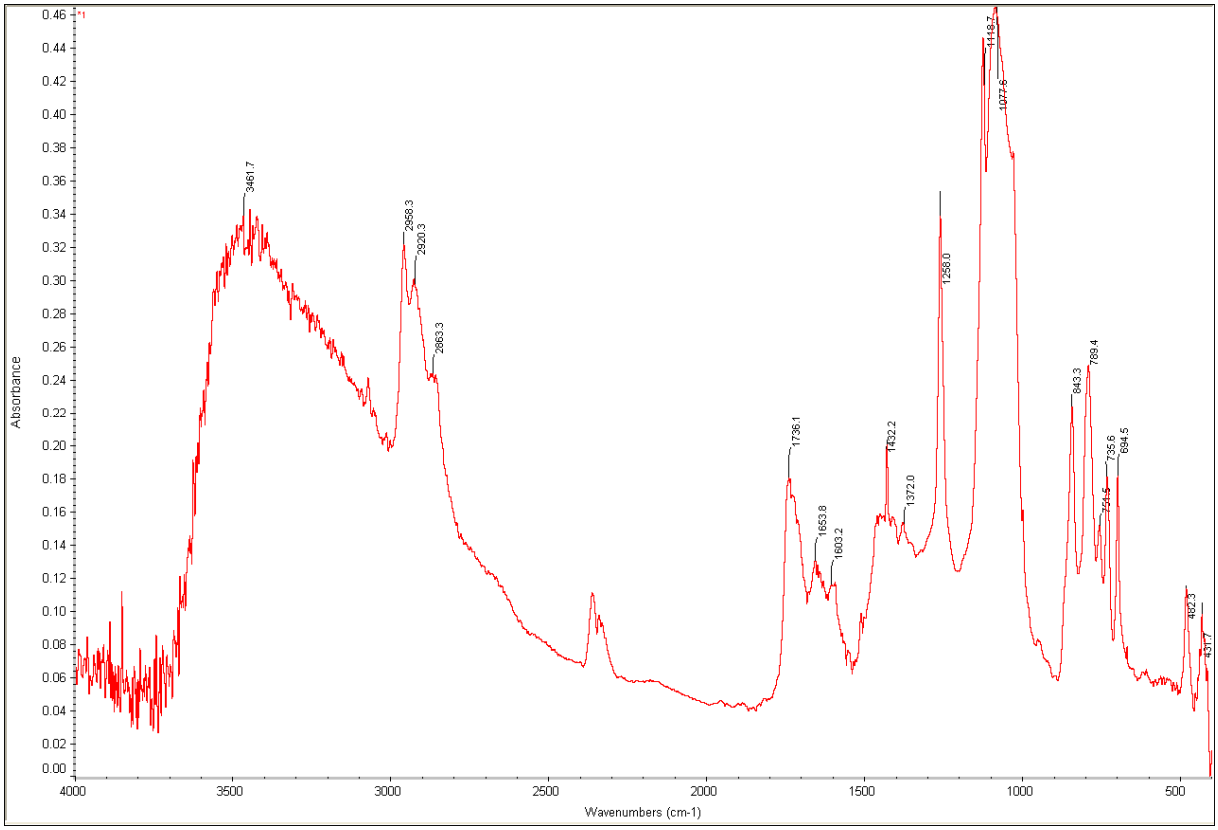


Figure S7. ATR-FTIR spectrum of SE-PHB formulation.

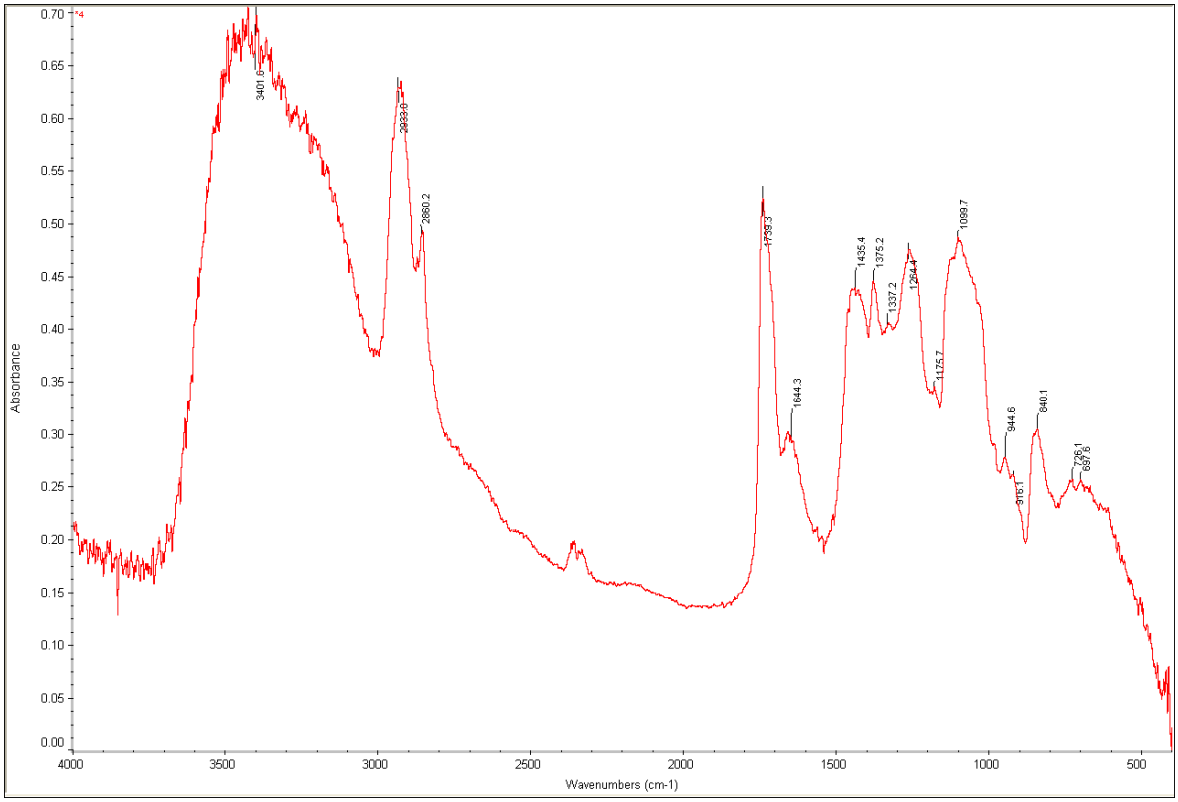


Figure S8. ATR-FTIR spectrum of GE-PHB formulation.

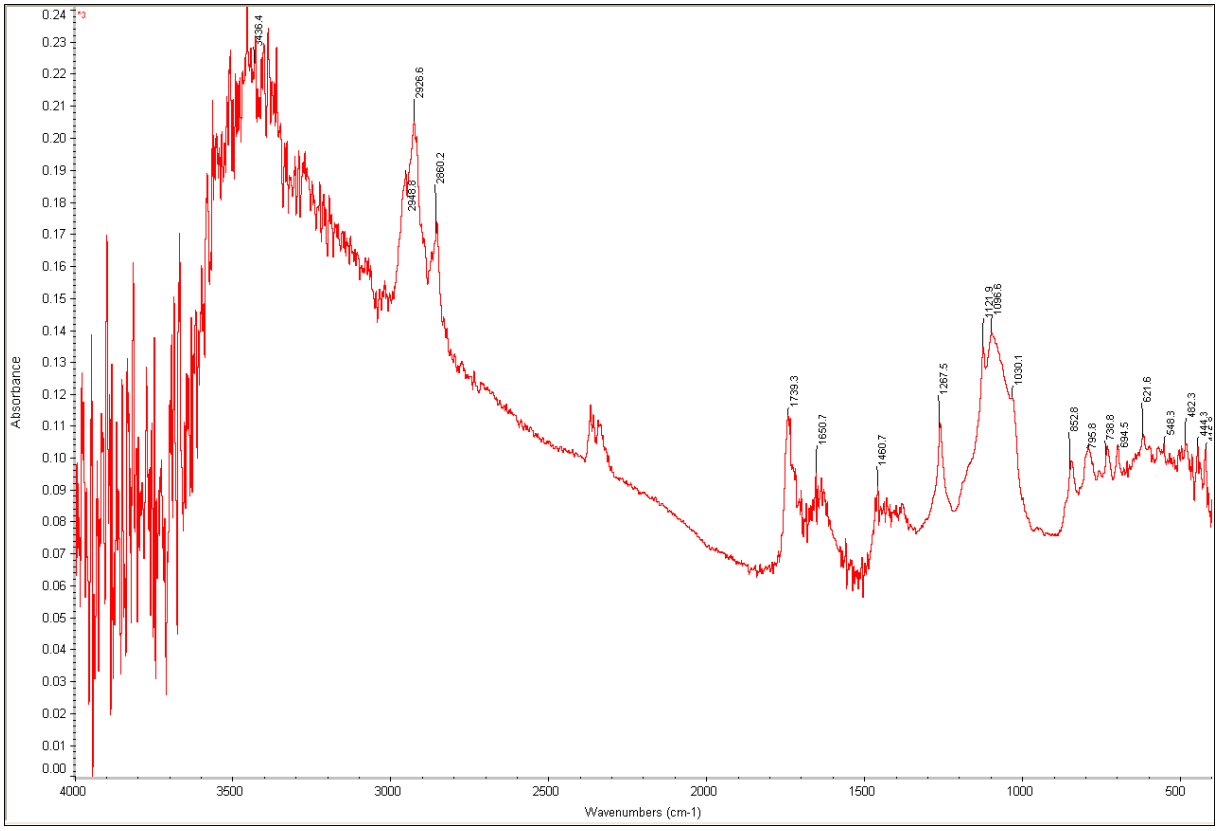


Figure S9. ATR-FTIR spectrum of CE-PHB formulation.

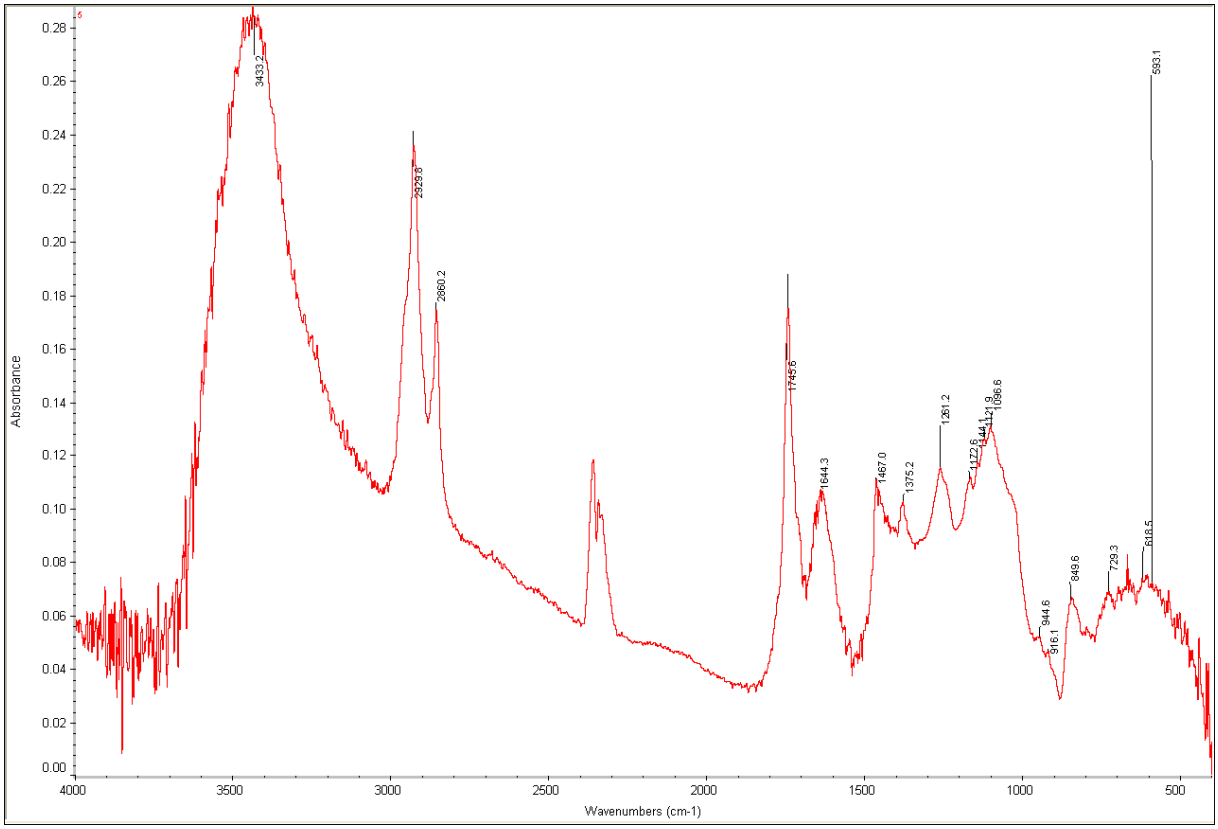


Figure S10. ATR-FTIR spectrum of SE-PLGA formulation.

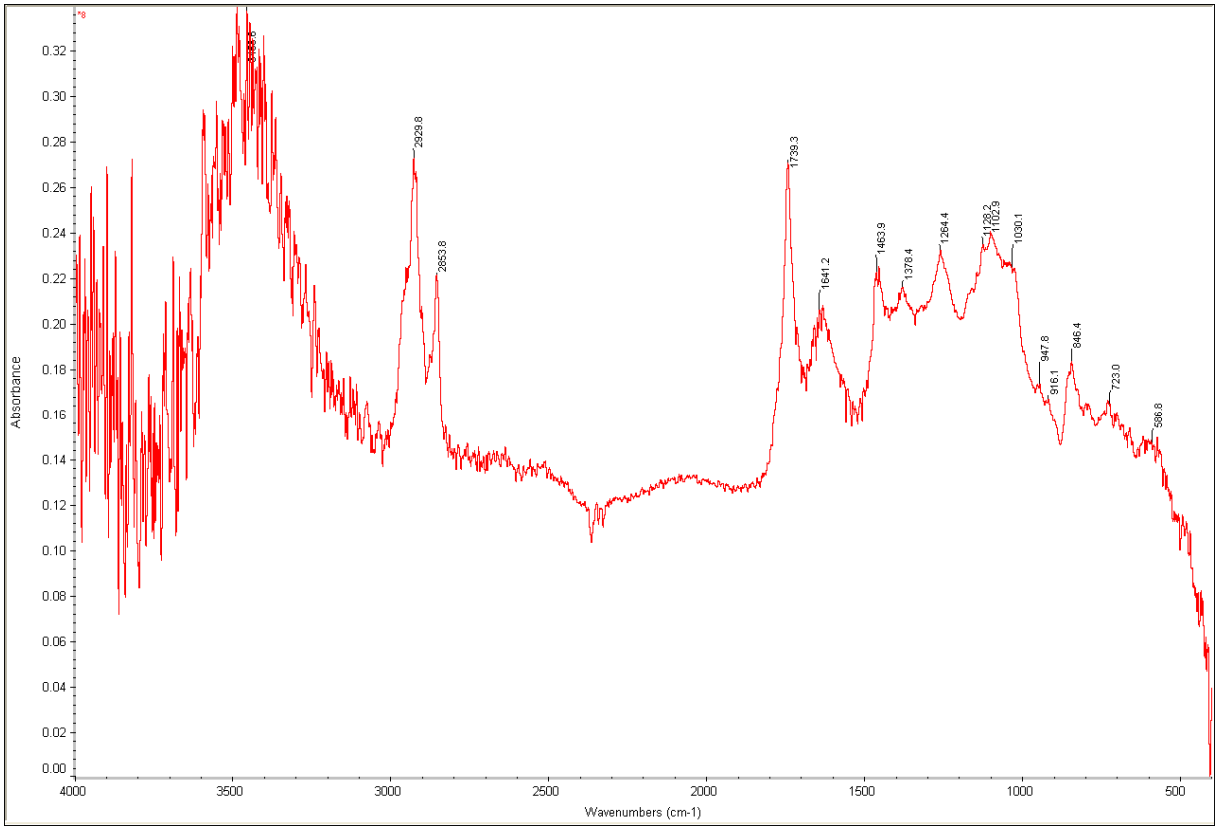


Figure S11. ATR-FTIR spectrum of GE-PLGA formulation.

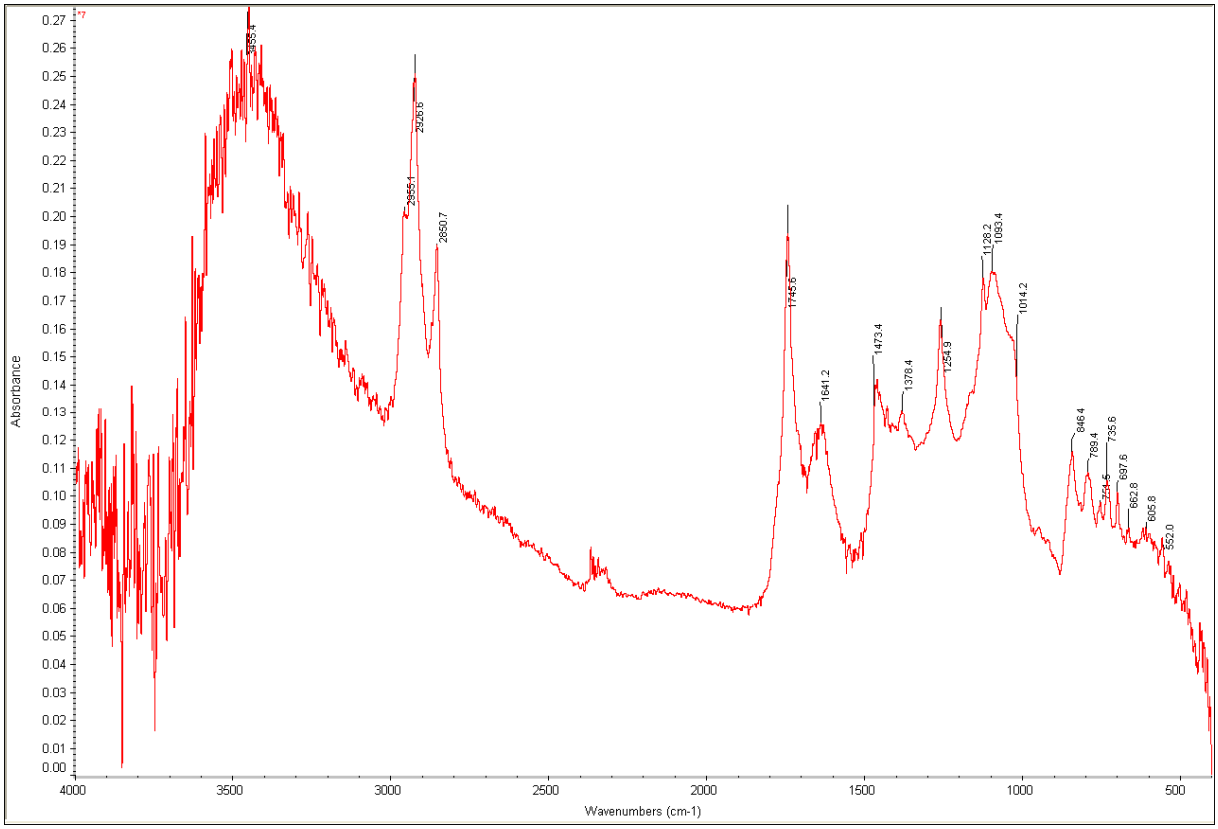


Figure S12. ATR-FTIR spectrum of CE-PLGA formulation.

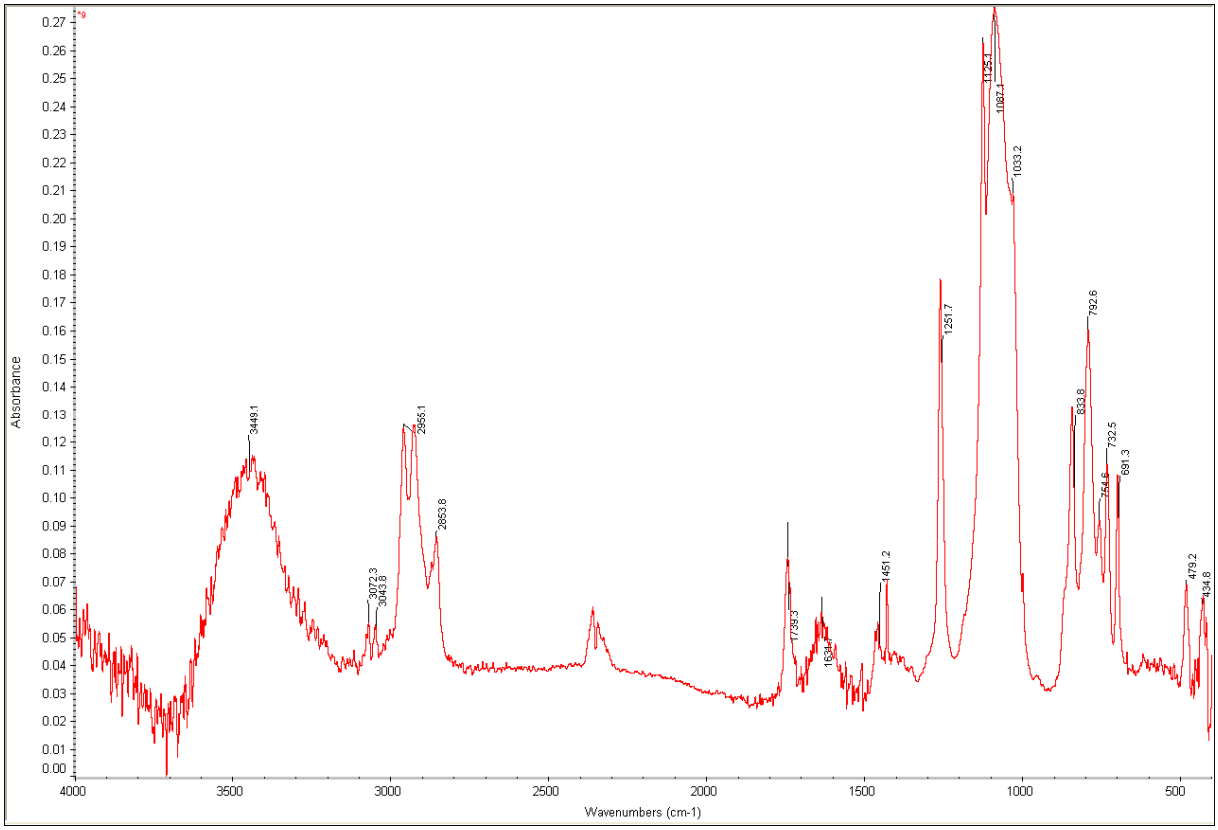


Figure S13. ATR-FTIR spectrum of SE-PHB-PLGA formulation.

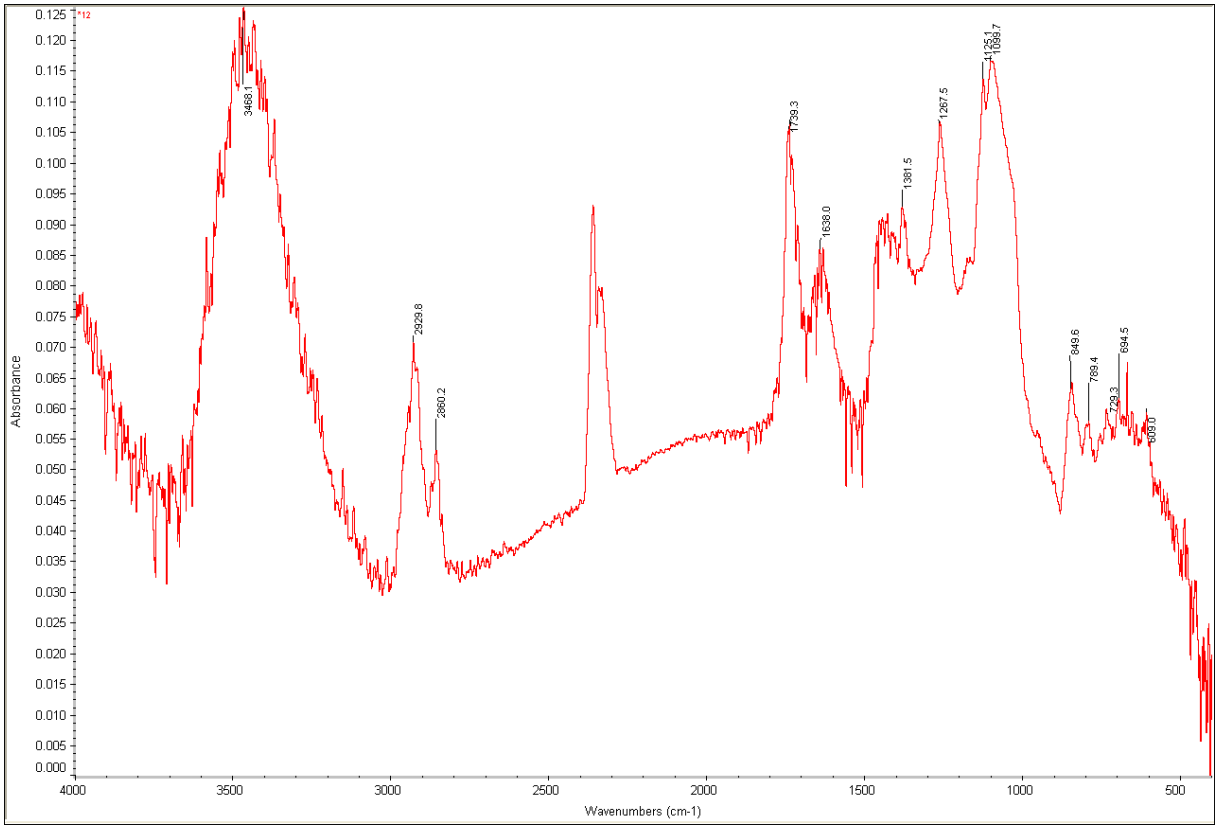


Figure S14. ATR-FTIR spectrum of GE-PHB-PLGA formulation.

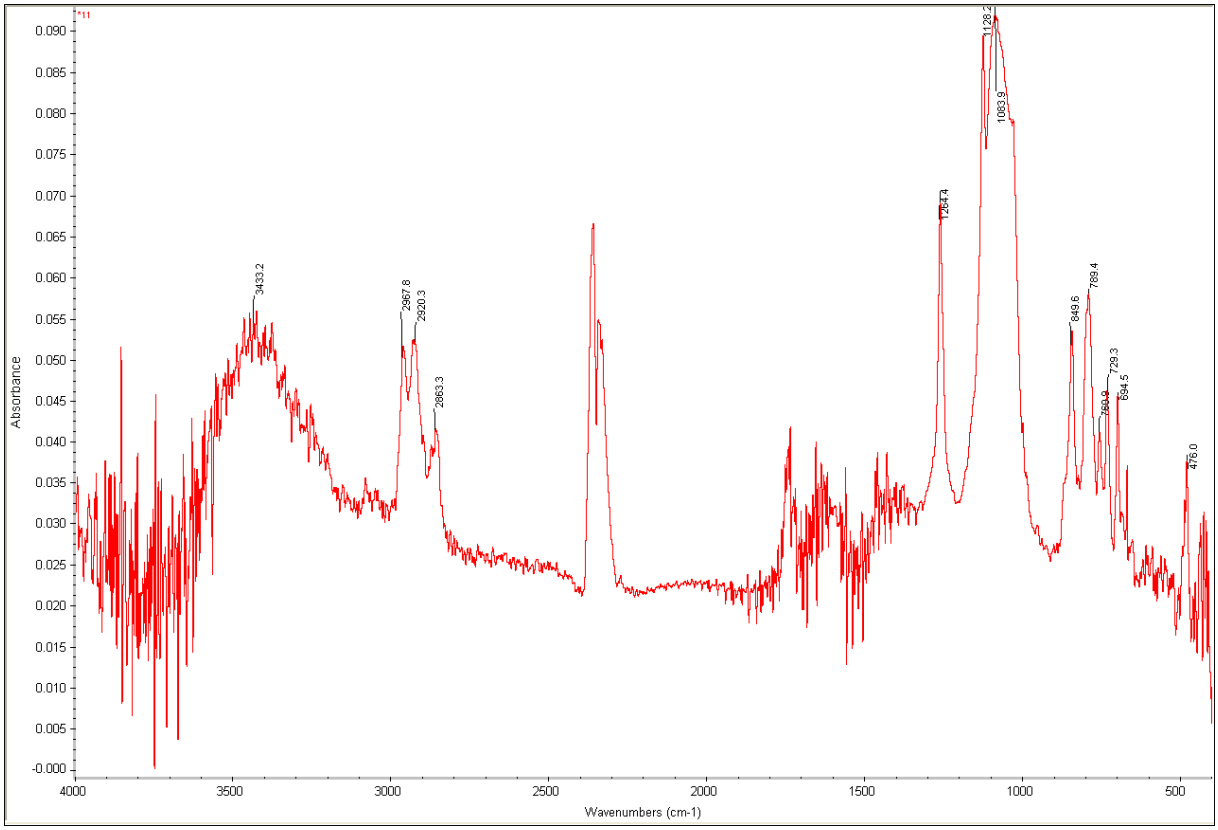


Figure S15. ATR-FTIR spectrum of CE-PHB-PLGA formulation.

Table S1. ATR-FTIR Analysis results—principal peaks' description.

Spectral region	Base components	Formulations	Peak description
4000-2500 cm^{-1} (single bonds region)	3645.4 (PLGA) 3500.1 (PLGA) 3430.1 (PHB) 3407.9 (SE) 3401.6 (CE) 3398.4 (GE)	3461.7 (SE-PHB) 3401.6 (GE-PHB) 3436.4 (CE-PHB) 3488.8 (GE-PLGA) 3455.4 (CE-PLGA) 3433.2 (SE-PLGA) 3449.1 (SE-PHB-PLGA) 3072.3 (SE-PHB-PLGA) 3043.8 (SE-PHB-PLGA) 3468.1 (GE-PHB-PLGA) 3433.2 (CE-PHB-PLGA)	>3000 stretching vibrations of O-H bonds from alcohols and phenols 3550-3450 cm^{-1} stretching vibrations of dimeric O-H
	2963.1 (PHB) 2961.5 (GE)	2958.3 (SE-PHB) 2955.1 (CE-PLGA, SE-PHB-PLGA) 2967.8 (CE-PHB-PLGA)	2970-2950 cm^{-1} asymmetric stretching vibrations of C-H bonds from methyl groups
	2926.6 (GE) 2923.5 (SE, CE)	2920.3 (SE-PHB, CE-PHB-PLGA) 2933 (GE-PHB) 2926.6 (CE-PHB, CE-PLGA) 2929.8 (SE-PLGA, GE-PLGA, GE-PHB-PLGA)	2935-2915 cm^{-1} asymmetric stretching vibrations of C-H bonds from methylene groups
	2879.2 (PLGA) 2866.5 (PHB)	2860.2 (SE-PLGA)	2880-2860 cm^{-1} symmetric stretching vibrations of C-H bonds from methyl groups
	2857 (PLGA) 2850.7 (GE, CE)	2860.2 (SE-PLGA,GE-PHB) 2853.8 (GE-PLGA, SE-PHB-PLGA) 2850.7 (CE-PLGA) 2863.3 (CE-PHB-PLGA)	2865-2845 cm^{-1} symmetric stretching vibrations of C-H bonds from methylene groups
	2651.2 (PLGA)	2663.3 (SE-PHB) 2660.2 (CE-PHB, GE-PHB-PLGA)	Around 2660 cm^{-1} stretching vibrations of O-H bonds from acids groups
2000-1500 cm^{-1} (double bonds region)	1761.5 (PLGA) 1733 (PHB) 1698.2 (GE)	1736.1 (SE-PHB) 1745.6 (SE-PLGA, CE-PLGA) 1739.3 (GE-PHB, CE-PHB, GE-PLGA, SE-PHB-PLGA, GE-PHB-PLGA)	1780-1650 cm^{-1} stretching vibrations of C=O bonds and 1750-1725 cm^{-1} corresponding to C-O vibrations from ester groups
	1650.7 (SE) 1625.3 (CE, PLGA) 1612.7 (SE)	1653.8 (SE-PHB) 1644.3 (GE-PHB, SE-PLGA) 1650.7 (CE-PHB) 1631.7 (GE-PLGA, SE-PHB-PLGA) 1641.2 (CE-PLGA) 1638 (GE-PHB-PLGA)	1680-1620 cm^{-1} stretching vibrations of C=C bond from alkenil groups and 1650-1600 cm^{-1} corresponding to conjugated quinones or ketones
	1609.5 (GE)	1603.2 (SE-PHB)	Around 1600 cm^{-1} vibrations characteristic to C=C conjugated bonds
	1514.5 (SE) 1508.2 (GE)		Around 1500 cm^{-1} corresponding to aromatic rings

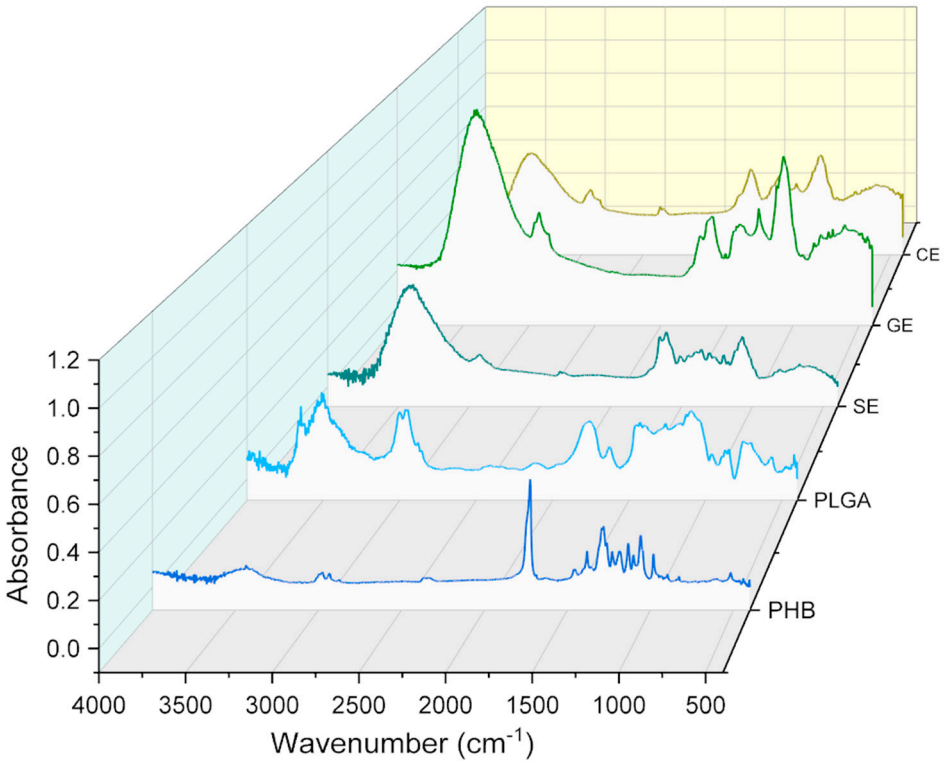


Figure S16. ATR-FTIR spectra of vegetal extracts and biopolymers.

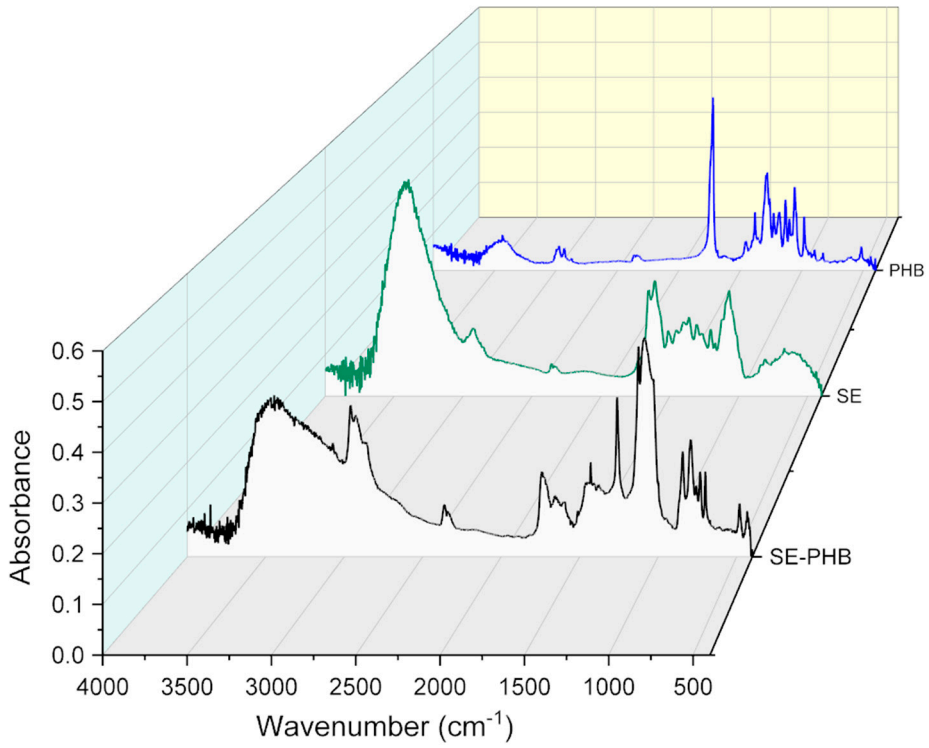


Figure S17. ATR-FTIR spectrum of SE-PHB formulation in comparison with base components' spectra.

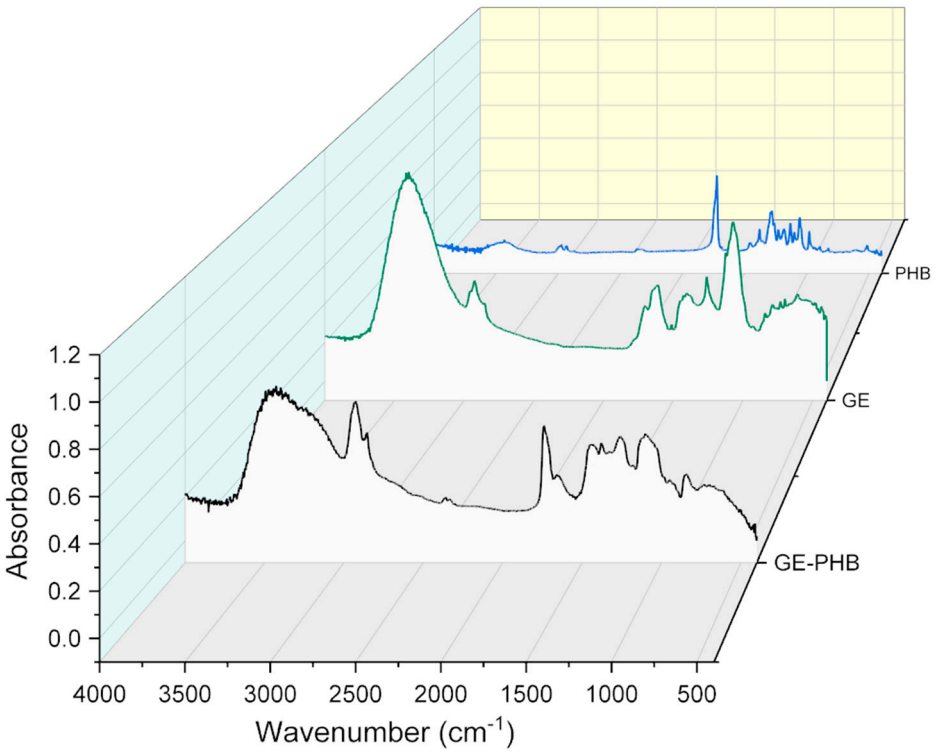


Figure S18. ATR-FTIR spectrum of GE-PHB formulation in comparison with base components' spectra.

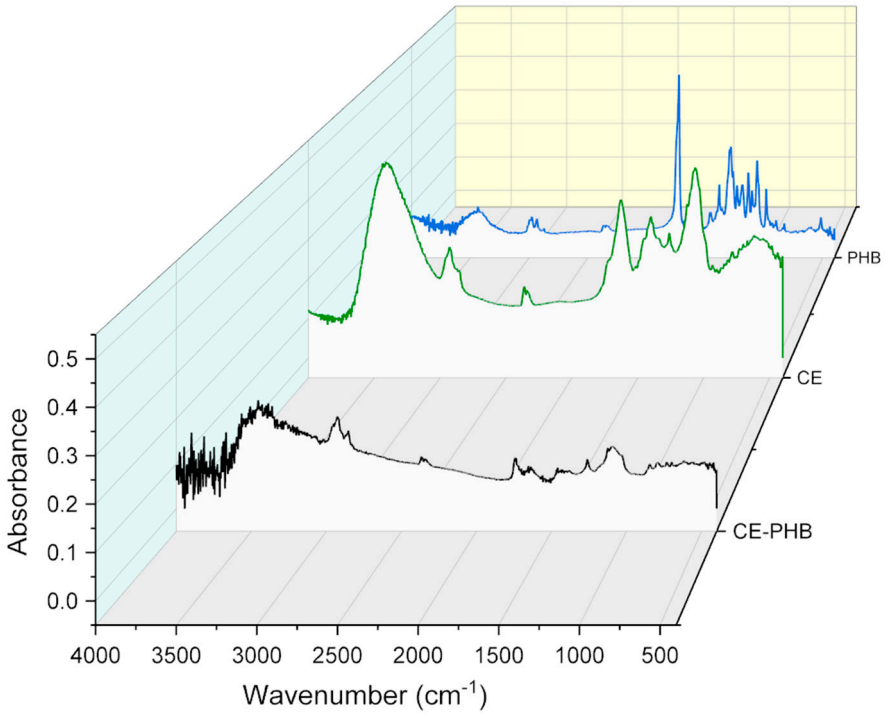


Figure S19. ATR-FTIR spectrum of CE-PHB formulation in comparison with base components' spectra.

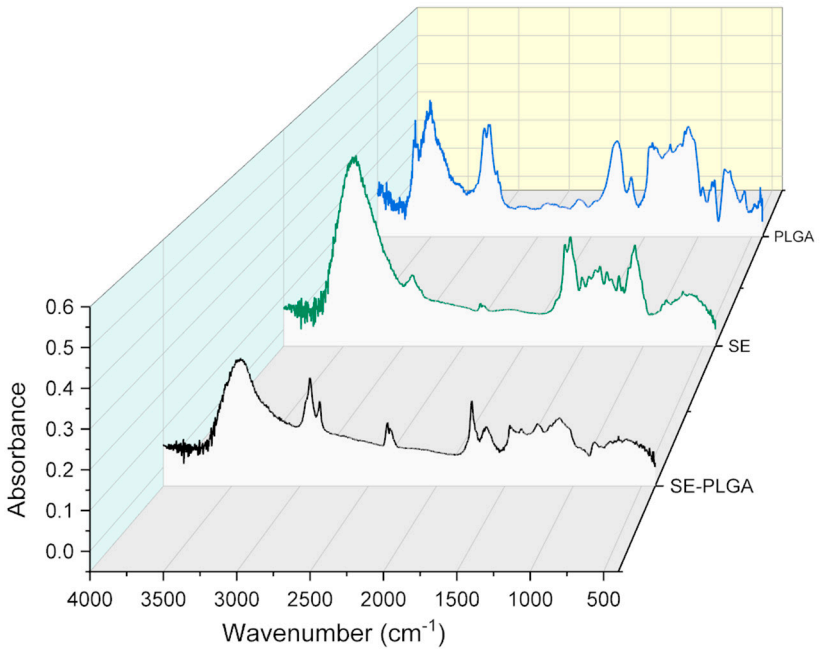


Figure S20. ATR-FTIR spectrum of SE-PLGA formulation in comparison with base components' spectra.

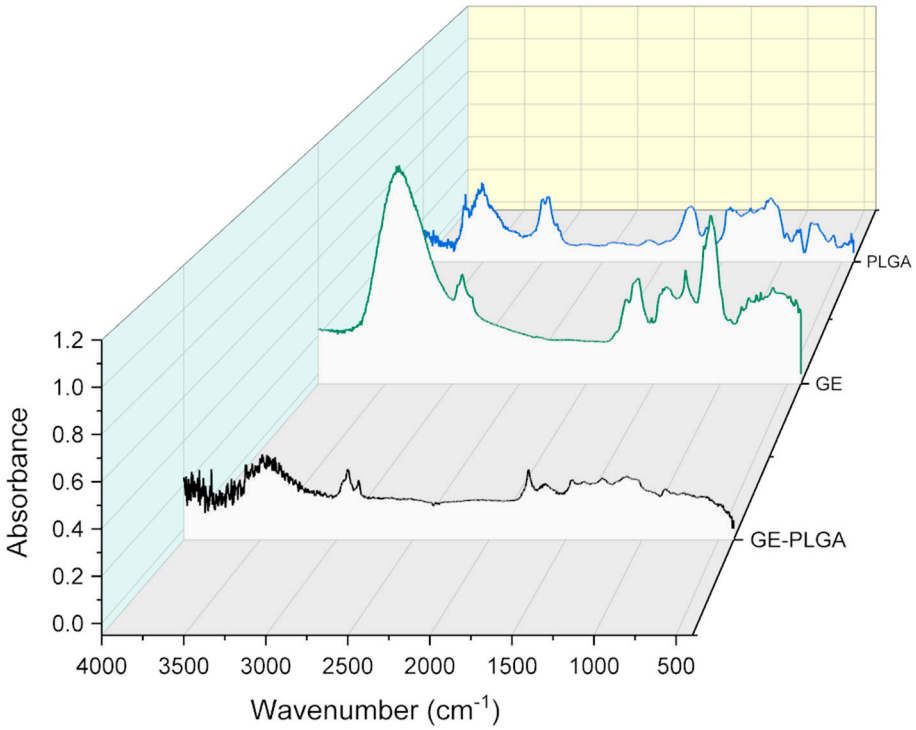


Figure S21. ATR-FTIR spectrum of GE-PLGA formulation in comparison with base components' spectra.

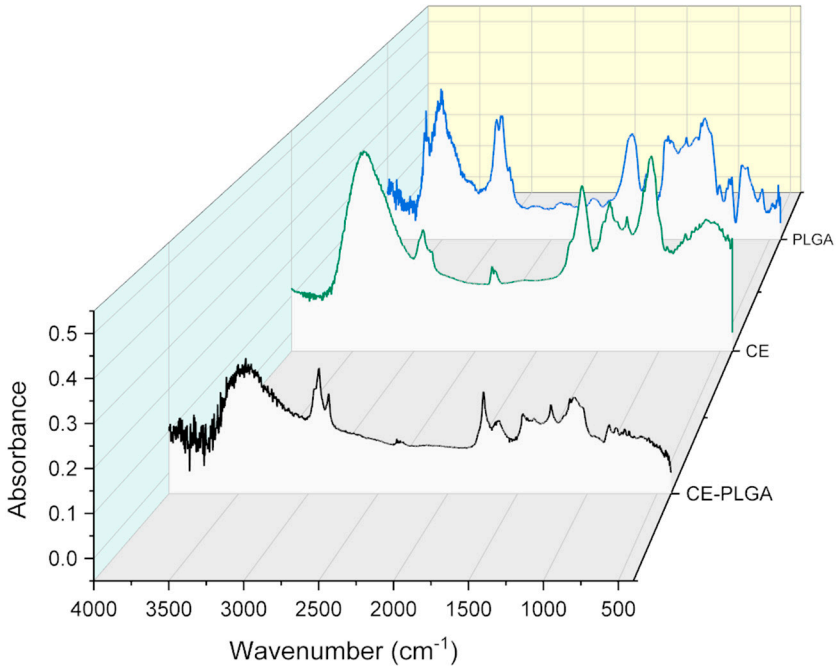


Figure S22. ATR-FTIR spectrum of CE-PLGA formulation in comparison with base components' spectra.

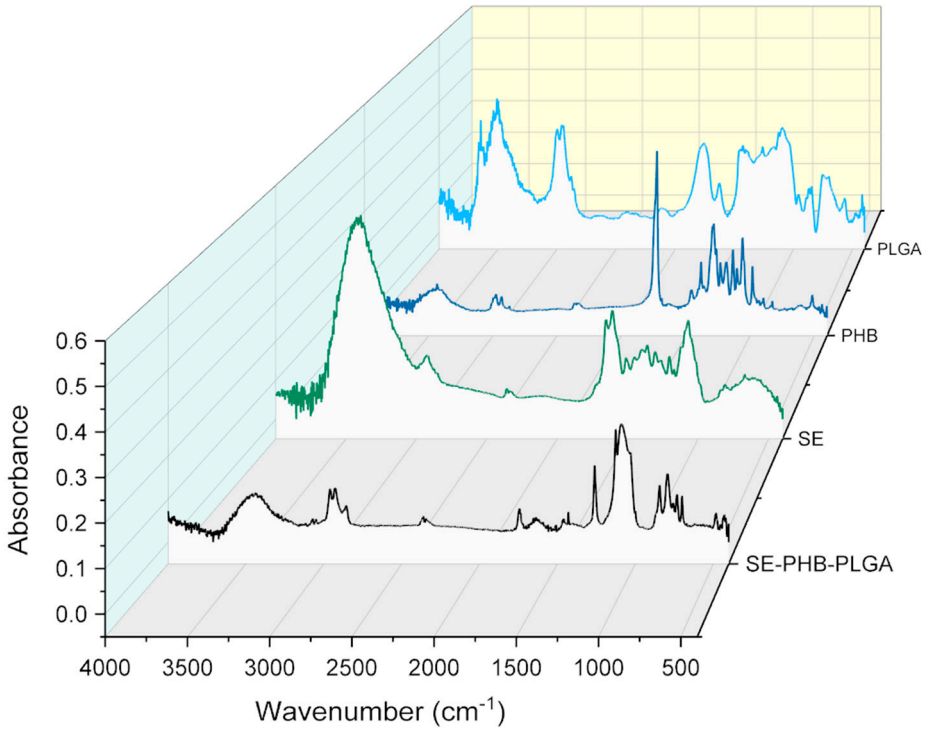


Figure S23. ATR-FTIR spectrum of SE-PHB-PLGA formulation in comparison with base components' spectra.

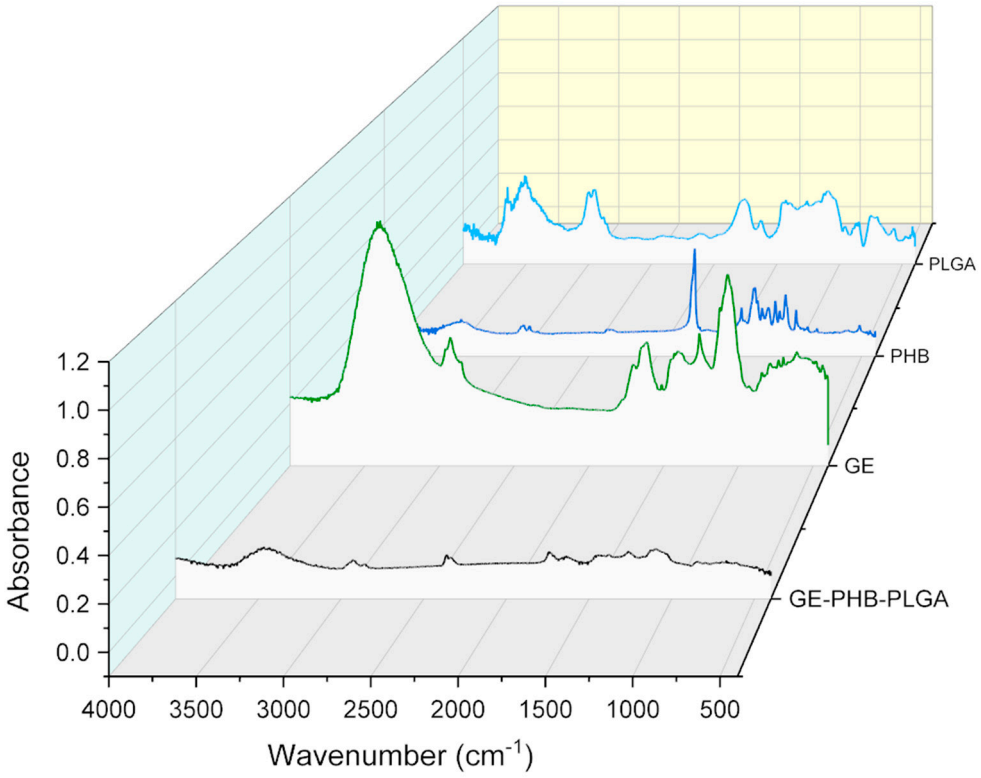


Figure S24. ATR-FTIR spectrum of GE-PHB-PLGA formulation in comparison with base components' spectra.

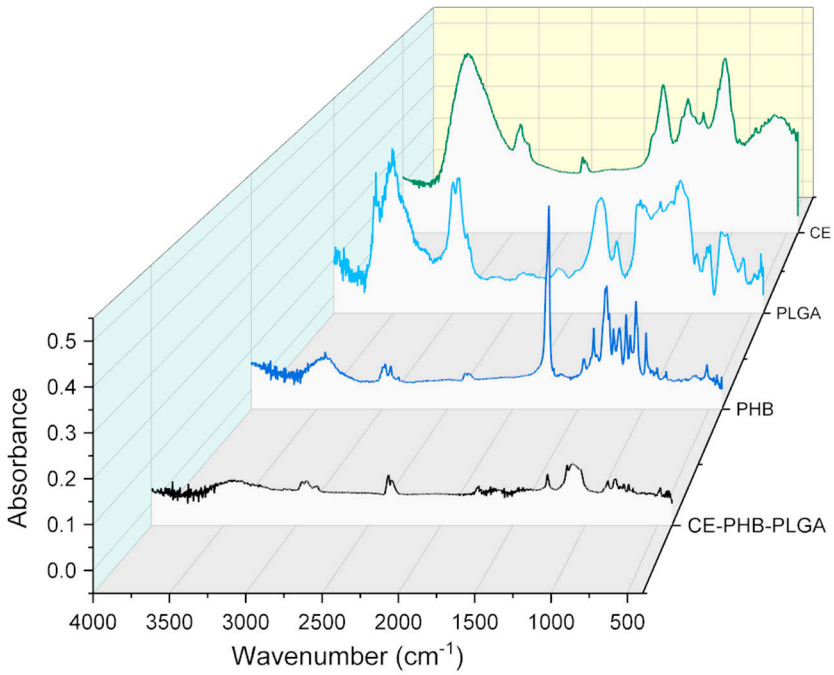


Figure S25. ATR-FTIR spectrum of CE-PHB-PLGA formulation in comparison with base components' spectra.

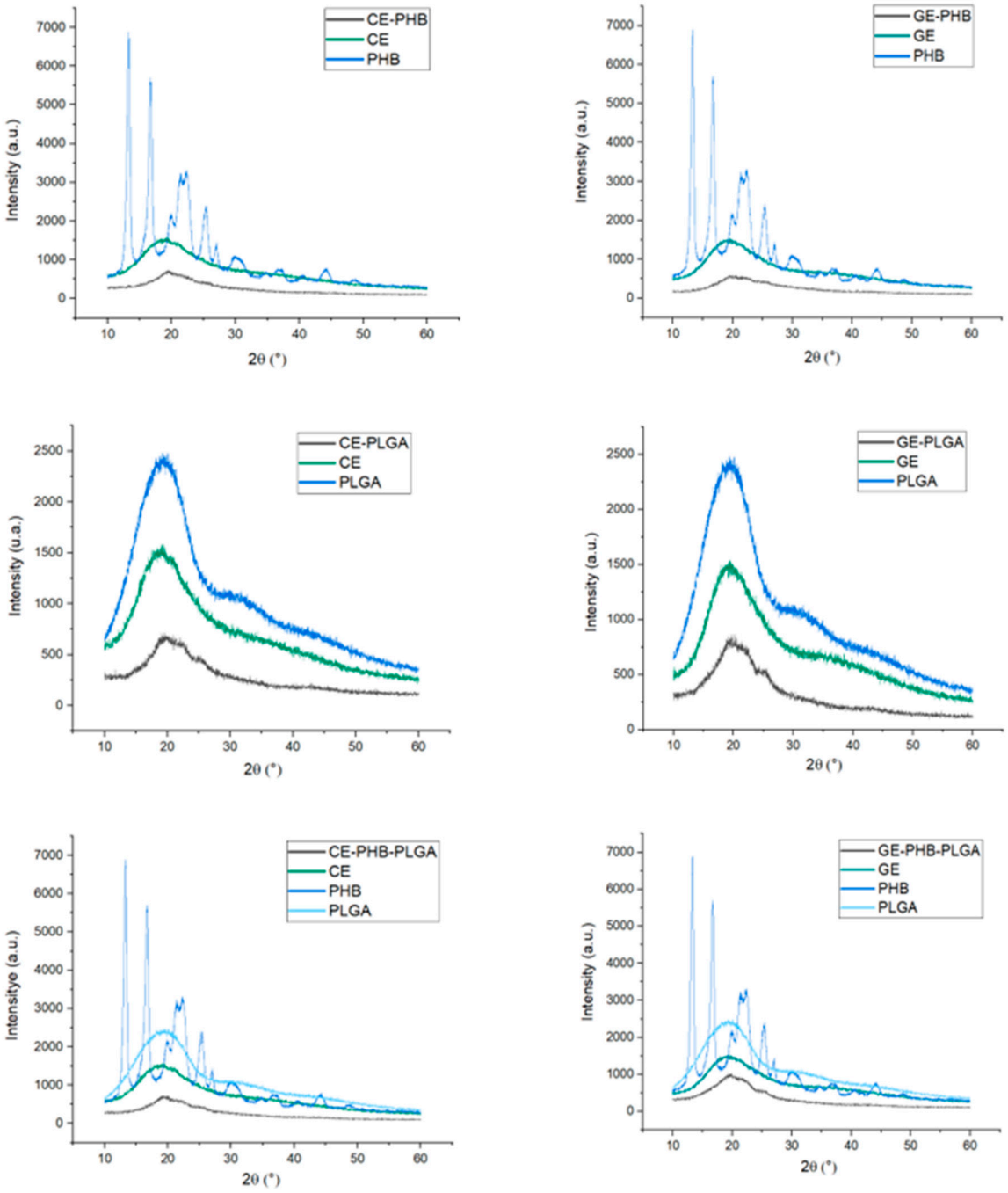


Figure S26. Diffraction patterns of formulations in comparison with base components.

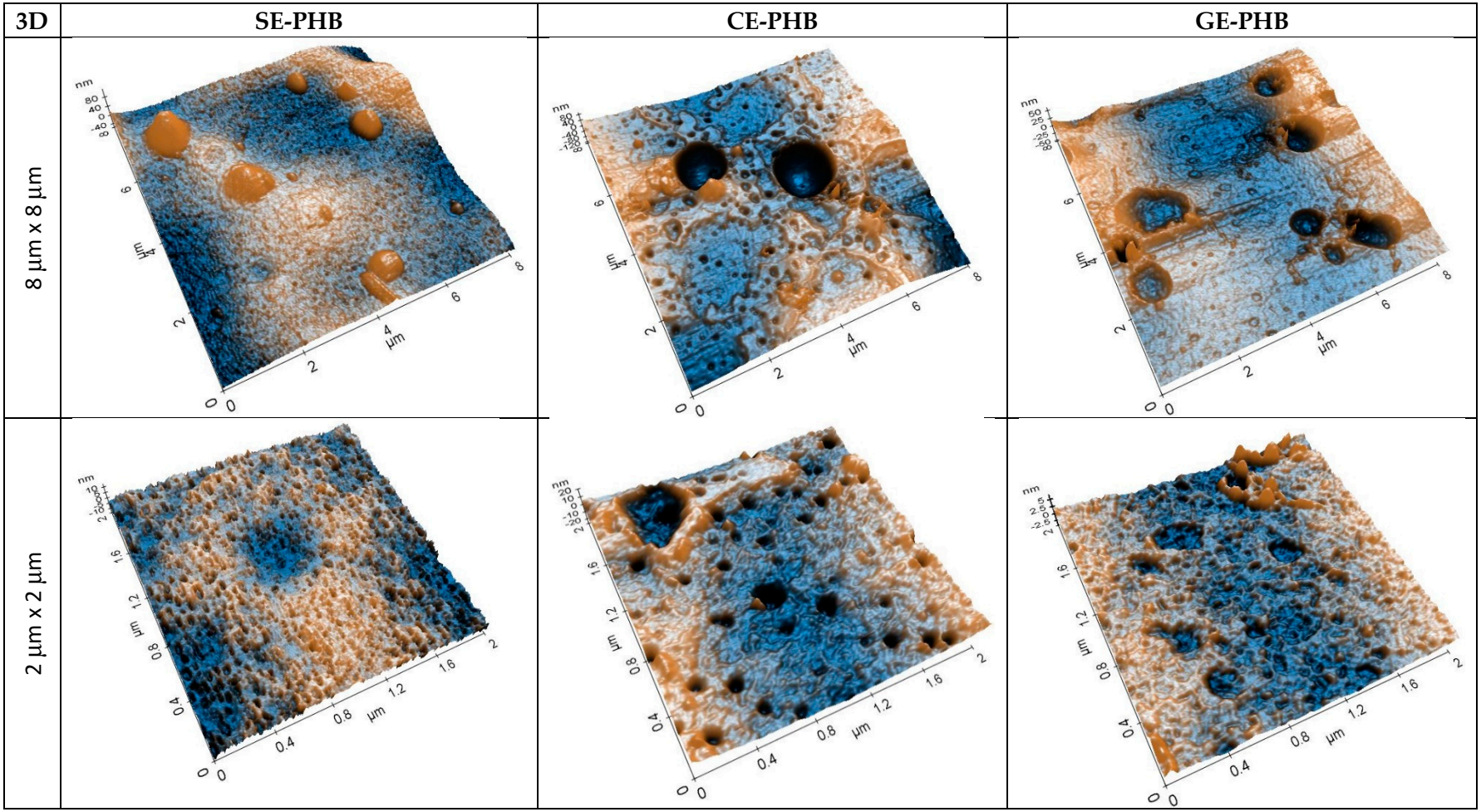


Figure S27. 3D AFM images of PHB formulations samples.

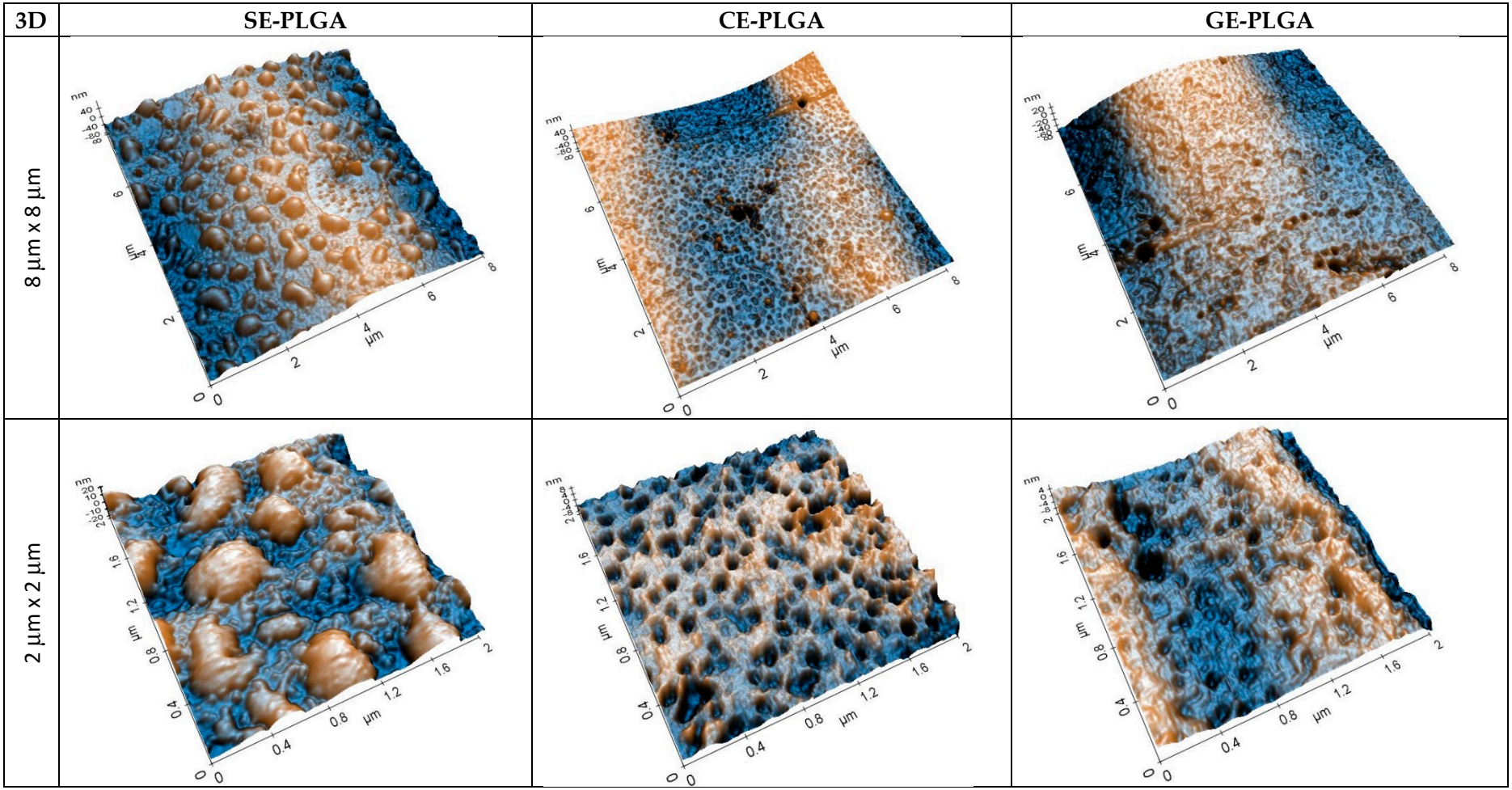


Figure S28. 3D AFM images of PLGA formulations samples.

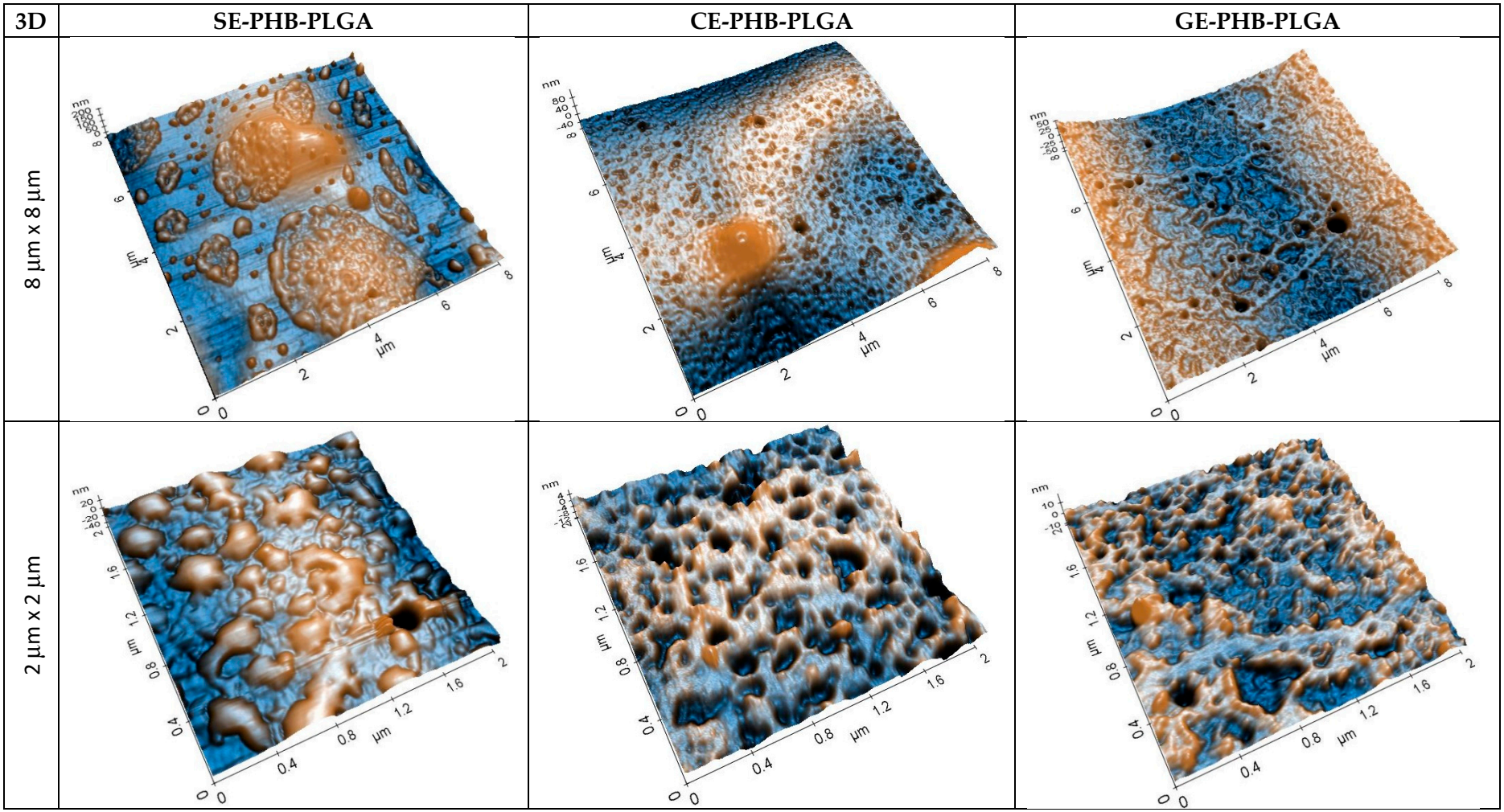


Figure S29. 3D AFM images of PHB-PLGA formulations samples.