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(57) Abstract :

The present invention relates to an artificial intelligence-optimized nanoemulsion system designed for enhanced bioavailability of herbal therapeutics. The system integrates machine learning algorithms including neural networks, random forest regression, and Bayesian optimization to predict and optimize formulation parameters based on physicochemical properties of herbal compounds. The nanoemulsion composition comprises herbal therapeutic compound, biocompatible oils, non-ionic surfactants, co-surfactants, and natural bioenhancers achieving droplet sizes of 10 to 150 nanometers with polydispersity index below 0.3. The AI-driven optimization reduces formulation development time by approximately 60 percent while achieving bioavailability enhancement ranging from 2-fold to 20-fold compared to conventional formulations. The invention provides a scalable, cost-effective platform for delivering poorly water-soluble phytochemicals with improved stability, controlled release characteristics, and enhanced therapeutic efficacy for diverse herbal compounds including curcumin, quercetin, resveratrol, and similar phytotherapeutics.

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