

Opto-Thermal Skin Hydration Depth Profiling Measurements Using Genetic Algorithm

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The water content in stratum corneum is very important, and plays a key role in its cosmetic properties, as well as its barrier functions. However, to measure the water content, and, especially, the water concentration depth profile within stratum corneum, is very difficult. Opto-thermal emission radiometry, or OTTER, is a promising technique that can be used for such measurements. In this paper, we present our study on stratum corneum hydration depth profiling by using a genetic algorithm (GA) to analyze the opto-thermal signals. We will first discuss the pros and cons of the GA compared with other inverse algorithms, such as neural networks (NN), maximum entropy (MaxEnt), conjugate gradient (CG), and singular value decomposition (SVD), etc. Then, we will show how to use existing knowledge to optimize the GA for analyzing opto-thermal signals. Finally, we will show our latest GA results on hydration depth profiling of stratum corneum under different conditions, as well as on the penetration profiles of externally applied solvents.