World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:12, No:06, 2018

Application of the Global Optimization Techniques to the Optical Thin Film Design

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Abstract : Optical thin films are used in a wide variety of optical components and there are many software tools programmed for advancing multilayer thin film design. The available software packages for designing the thin film structure may not provide optimum designs. Normally, almost all current software programs obtain their final designs either from optimizing a starting guess or by technique, which may or may not involve a pseudorandom process, that give different answers every time, depending upon the initial conditions. With the increasing power of personal computers, functional methods in optimization and synthesis of optical multilayer systems have been developed such as DGL Optimization, Simulated Annealing, Genetic Algorithms, Needle Optimization, Inductive Optimization and Flip-Flop Optimization. Among these, DGL Optimization has proved its efficiency in optical thin film designs. The application of the DGL optimization technique to the design of optical coating is presented. A DGL optimization technique is provided, and its main features are discussed. Guidelines on the application of the DGL optimization technique to various types of design problems are given. The innovative global optimization strategies used in a software tool, OnlyFilm, to optimize multilayer thin film designs through different filter designs are outlined. OnlyFilm is a powerful, versatile, and user-friendly thin film software on the market, which combines optimization and synthesis design capabilities with powerful analytical tools for optical thin film designers. It is also the only thin film design software that offers a true global optimization function.

Keywords : optical coatings, optimization, design software, thin film design
Conference Title : ICTFTA 2018 : International Conference on Thin Film Technology and Applications
Conference Location : Copenhagen, Denmark
Conference Dates : June 11-12, 2018