

Preface

Every material – eg. metals, ceramics, has an interface that is a contact point with another kind of material in a working condition. The properties of this interface are essentially different than those of the substrate. Also, an operating/working condition i.e. (friction, working temperature) differs from that of operating conditions of the base material. The ability of the material to withstand this condition is mainly determined by the structure and chemical composition of the surface layer. Therefore, it is obvious, that technologies that can be used to tailor the properties of surface layers will promise large benefits.

At present, the surface modification technologies are used to modify chemical, physical, mechanical and functional properties – such as wear and corrosion resistance, surface wettability, biocompatibility, surface friction, fretting fatigue etc. Moreover, the surface treatments technologies are commonly used at the completion of fabrication and finishing processes. The surface modification technologies can be divided into three main categories: (1) addition of material to the substrate material to achieve desirable properties due to changes in chemical composition, (2) conversion of an existing surface layer and (3) removal of the material to obtain specific topographies.

This special issue entitled „Advances in laser and surface material processing” provides a broad overview of methods of laser surface treatment and modern surface modification technologies applied to engineering materials. The articles focus mainly on the effect of processing conditions on the surface properties, structure as well as the manufacturing process optimization. The major purpose of this book is to present and discuss various problems in surface treatment technology, related to the structure and properties of various materials.