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PRIORITIES AND EXPECTATIONS FOR SURFACE ENGINEERING – A PERSONAL VIEW

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Surface engineering is currently attracting wide attention. The need to engineer surfaces for specific performance requirements has always been present but, until recently, the means available to accomplish this were few. The situation has changed dramatically during the past few decades when the rate, at which new surface modification processes appear, has escalated rapidly. The growth has been driven by synergistic advances in process control, modeling, materials and surface science, and in instrumentation which enables us to closely analyze and observe the surface and the near-surface material in great detail. At this point industrial adaptation of the new processes is lagging somewhat, awaiting maturation of the most promising processes so they can be reliably used in mass production.

In this brief paper I present a very personal view of what the expectations for the future could be and what ought to be the research priorities. The research aganda for the next decade or so should address the two primary general focus areas:

1) the somewhat mundane needs for better process control, scale-up capabilities, in-situ testing, residual stress control, design of compound coatings, life-cycle design, etc.; and
2) the adaptation of current and new knowledge towards changing the surface's role from one of being simply the last plane of atoms in an object, or its forward material, to becoming its "skin", an integral component of the object but one which has its own specific functions of protection, exchange of energy and mass, sensing and actuation, and collecting, storing, forwarding, or acting on information.