

Surface engineering of nanomaterials

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Abstract

At present, nanomaterials (NMs) show extreme potential for a wide range of applications ranging from aerospace to energy storage applications owing to a number of properties which, in a number of contexts have been reported to be superior as compared to those of bulk counterparts. However, the high surface area to volume ratio which yields extraordinary properties to NMs also turns out to be the major limitation in a number of different contexts. For instance, the high surface area to volume ratio in these materials leads to a high reactivity, especially in electrochemical environments which are prevalent during energy storage applications. In this context, it is worthwhile mentioning that processing of NMs play a crucial role in influencing their mechanical properties. On the other hand, surface engineering has emerged as a powerful tool to deconvolute bulk properties from surface characteristics and has been reported to exhibit tremendous potential for overcoming the aforementioned limitation of NMs. The present review therefore, is aimed at highlighting the present status of research in the field of processing and applications of surface engineered NMs. Moreover, challenges and future perspectives in the aforementioned avenue have been discussed.

Keywords: Nanomaterials, Chemical Vapour Deposition, Atomic Layer Deposition, pseudocapacitors, batteries.