

表面コーティングの自己修復技術・応用の現状と今後の展開

The Present and Promising Technologies and Applications of Self-healing Surface Coatings

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Abstract

After an overview of present approaches and technologies in self-healing bulk polymers and surface coatings are given, the scope and expectation for new approaches and applications are discussed. The self-healing bulk polymers were developed for space uses and airplane materials. The pioneer work of this field is the self-healing bulk polymer containing microcapsules of healing agent, which attracted researcher's attention. The self-healing concept and technique were used for developments of various new materials. These materials, however, were not to be used as industrial applications because of their high cost. The first merchandised self-healing material was surface coating for car body developed by a Japanese car maker. The scratch of surface coating is self-healed only by sunlight. The well-known visco-elastic deformation and the hydrogen bonding between main chains in polymer are used for the self-healing. The low cost and the very easy technology of the method made it possible to be merchandised and used widely. It is expected that the self-healing coating combined with self-cleaning ability wins potential customers and new material of graphene leads to innovative self-healing technologies.

キーワード：粘弾性変形、水素結合、擦り傷・切り傷、自己修復・クリーニング、
車体コーティング

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Body coatings

1. はじめに

自己修復材料の研究開発は、破損による損害が甚大で、応急の修理が困難な機器に使用される部材を対象に行われてきた。このような部材としてスペースシャトルや戦闘機の燃料タンク材料の自己修復化研究が米国の National

Aeronautics and Space Administration (NASA) や Department of Defense (DoD)¹⁾ によって主導されてきた。修復剤内包のカプセルを分散させるなどにより、高分子材料のクラックを短時間で目に見える修復効果を発現させ、自己修復材料研究が注目されるようになった。このような自己修復材料や技術を宇宙や武器用から民生用にスピノフさせるとなると、高コストであることがネックとなって実用化はされてこなかった。しかしながら思わぬ分野で、しかも自己修復では遅れていたわが国が自己修復材料を初め

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