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Keywords

Nanofilms of alloys: Metal materials coated textiles;

Structure, Properties and Applications of Metal Materials Coated Textiles

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Opinion

Nanofilms of alloys, such as Ti, Zn-Al alloys, etc, were found to be of some interesting properties, such as good air permeable, water repellency, anti-static, anti-bacterial and shielding radiation. Structure, properties and applications of metal materials coated textiles have exhibited their specific features not only for decorative effects but also for functional properties. Two metallized textiles methods are involved, namely vacuum deposition and sputtering. The metallized textiles so produced could be applied for protective textiles and optical lenses and ultra-precision facilities [1, 2]. During manufacturing and the after service using, the textiles, lenses and most optical instruments and ultra-precision facilities could be often contaminated. The bacteria contaminated surface of the materials is harmful for human health and considerably limits the application. It has been found that nanofilms of Zn-Al alloys are of good anti-bacterial functions. Shown in (Figure1) is the observation of the ZA coated silk fabric for Staph.

Bacteria-free rings were formed after cultured condition at 37 °C for 24 hours. Shown in (Figure 2) are nanostructure of as deposited film (a) and structural evolution (b) and transitional phase formed inside the Z-zones of nanofilm of alloy ZnAl7Cu2.3 (c) after ageing at 220 °C for 85 hrs. Shown in (Figure 3a, 3b & 3c) are SEM images of the ZA alloy coated silk. Typical nanoparticles of about 100-150 nm in diameter were coated on the silk [3, 4]. The structural evolution of the nanophases has been previously studied, Shown in (Figure 3d, 3e & 3f) are SEM images of the ZA alloy films after ageing at various periods of time at 220 °C. It was also reported that the nanophase purposed a strong preferred orientation, which resulted in retardation of the decomposition of the nanophase. Nanostructural evolution is of practical importance for the application of anti-bacteria thin films of Zn-Al based alloys.

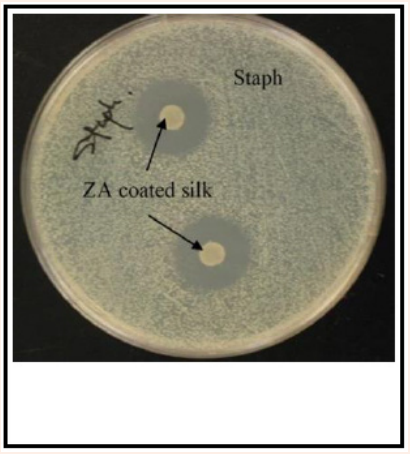

Figure 1: Inhibition zone with Staph on ZA alloy coated silk fabric after cultured condition at 37 °C for 24 hours.

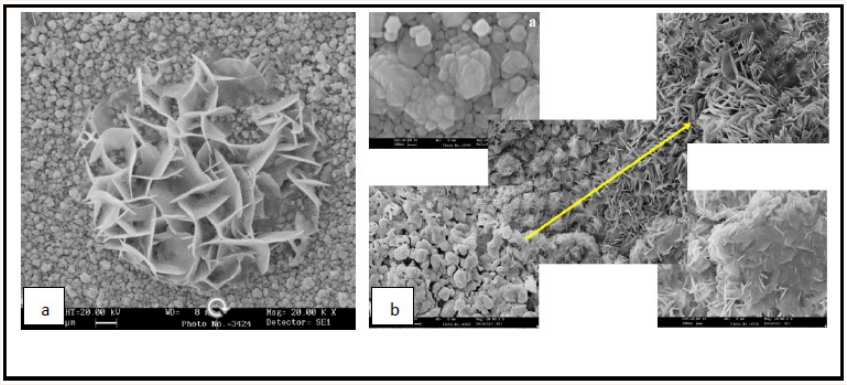

Figure 2: Nanostructure of as deposited film (a) and structural evolution (b) and transitional phase formed inside the Z-zones of nanofilm of alloy Zn90Al7Cu3 after ageing at 220 °C for 85 hrs.

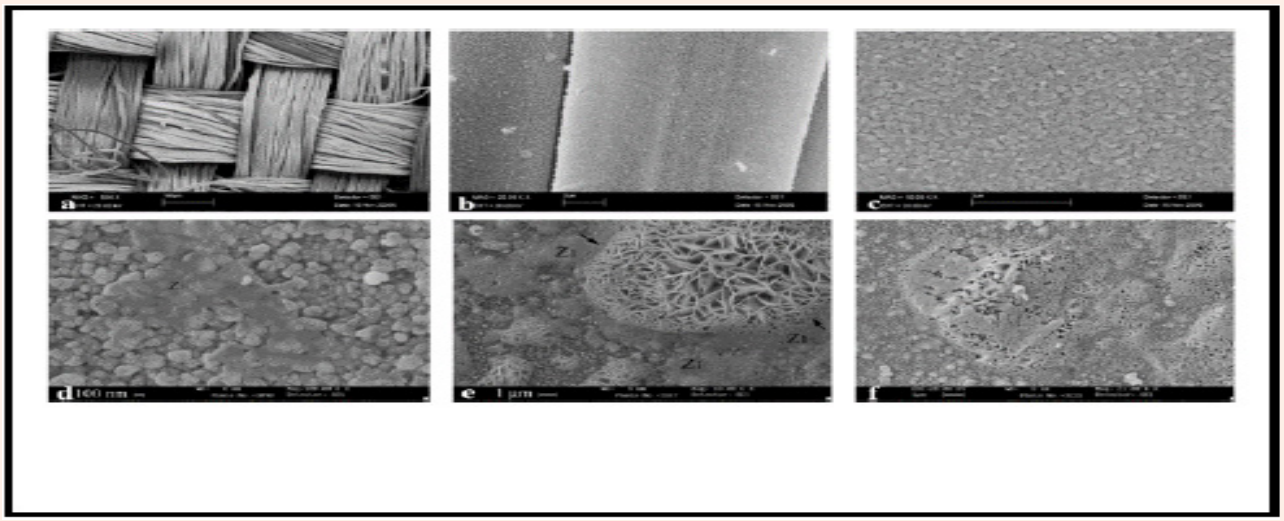

Figure 3: SEM images of the Zn-Al based alloy coated silk during ageing at 220 °C.

References

1. Yaohua Zhu (2018) Research road map approaching thin films of TCO and TE semiconductors Part 1 on electropulsing induced phase transformations in alloys. Lambert Academic Publishing.
2. Yaohua Zhu (2018) Research road map approaching thin films of TCO and TE semiconductors Part 2 On electropulsing induced phase transformations in thin films of Bi-Te and AZO semiconductors. Lambert Academic Publishing.
3. Yaohua Zhu (2020) Advanced Physical Metallurgy of Alloys and Thin Films of Semiconductors Volume 1 on Thermal Ageing-and External Stress Induced Phase Transformations in Alloys. Lambert Academic Publishing.
4. Yaohua Zhu (2020) Advanced Physical Metallurgy of Alloys and Thin Films of Semiconductors Volume 3 Use of EBSD in Studies of Phase Transformations of Alloys in Alloys. Lambert Academic Publishing.