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Glancing Angle Deposition for Practical Applications

斜め蒸着法の応用に関する研究

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Shadowing growth by glancing angle deposition (GLAD) has been providing self-assembled nanostructures over much larger area for much lower costs since much earlier than the recent advanced top down processes do. In these two decades, significant progress has been made in the development of the well-controlled 3D nanomorphologies such as zigzag and helix. Much effort for theoretical and numerical understanding of the growth mechanism has been also paid in order to improve the morphology. Many researches in academia have been investigating useful properties of nanocolumnar thin films in their laboratory; magnetic anisotropy, birefringence, dichroism, optical activity induced by nanoshapes; improved catalysis and high performance electrode using large surface are; various size effects. On the other hand, most companies seem hesitate to introduce GLAD technique into the factory due to the prejudice that the obliquely deposited thin films are not durable and reproducible. However, there have been some products of obliquely deposited thin films, although their production processes are not necessarily disclosed. In this presentation, we present the previous products and investigations of the GLAD thin films and discuss that the negative prejudice can be overcome [1]. In addition, we will introduce our recently commercialized products produced by GLAD technique. Those are surface enhanced Raman substrate [2] and low reflectivity wire-grid polarizers [3]. Because the GLAD films have the great potential to overcome the energy and environmental problems confronting humankind, it is important to encourage the industries by wiping away the negative prejudice of the GLAD films.

[1] M. Suzuki, “Practical applications of thin films nanostructured by shadowing growth,” Journal of Nanophotonics **7** (1), 073598-073598 (2013).

[2] M. Suzuki et al., “Au Nanorod Arrays Tailored for Surface-Enhanced Raman Spectroscopy,” Analytical Sciences **23**, 829-833 (2007).

[3] M. Suzuki et al., “Low-reflective wire-grid polarizers with absorptive interference overlayers,” Nanotechnology **21**, 175604 (2010).