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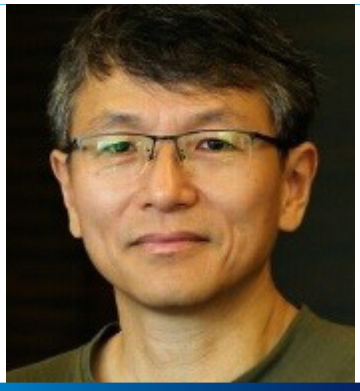
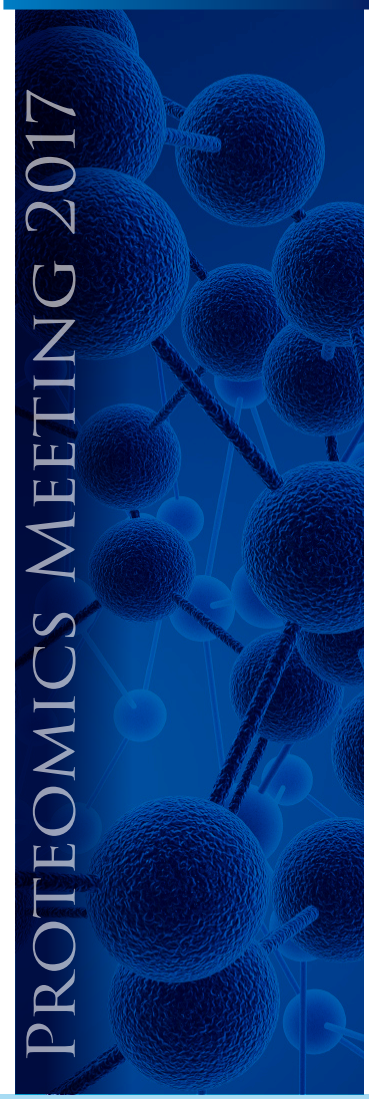
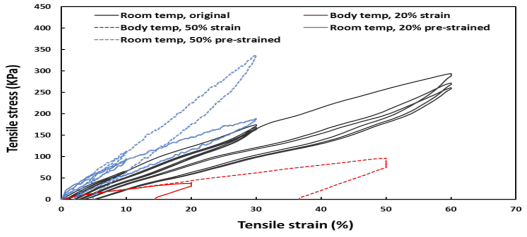


Wei Min Huang

Nanyang Technological University, Singapore



Rubber-like shape memory polymer programmable at body/room temperature: Features and applications in comfort fitting



The shape memory effect (SME) refers to an interesting phenomenon that a piece of quasi-plastically deformed material is able to recover the original permanent shape, but only if the right stimulus is applied. Such a phenomenon has been found in a range of materials, such as, metal/alloy, polymer and ceramic etc., which are technically called shape memory material (SMM). Thus, those SMMs activated upon heating are termed heating-responsive SMM. Although at high temperatures, most shape memory polymers (SMPs) could be very soft and highly elastic, at low temperatures/room temperature, they are normally much harder than ordinary rubber-band and some of them are indeed very brittle. So far, limited rubber-like SMPs (at room temperature) have been reported in the literature. In a hybrid made of silicone and melting glue is demonstrated to be rubber-like at room temperature even after being programmed with significant quasi-plastic deformation. However, it must be programmed at high temperatures, which is well above our body temperature. Similarly, the elastic shape memory foam reported in requires to be programmed at high temperatures as well. Comforting fitting is required in many applications for the purpose of personalization. And in many occasions, it is required to be contacted directly with part of the human body for perfect fitting. Hence, programming of the SMP must be carried out at around body temperature and enough time window for programming (e.g., 3-5 min) is also required. In this talk, we present our most recent progress in this research field. In addition, potential applications for comfort fitting are discussed and demonstrated by prototypes.

Recent Publications

1. Wang T, Huang W, Aw J, He L and Vettorello M (2017) Comfort Fitting Using Shape Memory Polymeric Foam. *Journal of Testing and Evaluation*; 45: 1201-12.
2. Sun L, Huang W, Wang T, Chen H, Renata C, He L, et al. (2017) An overview of elastic polymeric shape memory materials for comfort fitting. Mater Des.; 136: 238-48.

Biography

Wei Min Huang is currently an Associate Professor at the School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore. With over 20 years of experience on various shape memory materials (alloy, polymer, composite and hybrid), he has published over 180 papers in journals, such as Accounts of Chemical Research, Advanced Drug Delivery Reviews and Materials Today and has been invited to review manuscripts from over 200 international journals (including Progress in Polymer Science, Nature Communications, Advanced Materials and Advanced functional materials, etc.), project proposals from American Chemical Society, Hong Kong Research Grants Council, etc. and book proposals from CRC and Elsevier. He has published two books entitled "Thin Film Shape Memory Alloys: Fundamentals and Device Applications" and "Polyurethane Shape Memory Polymers" and is currently on the Editorial Board for many journals.

mwmhuang@ntu.edu.sg