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ADVANCED MATERIALS

Supporting Information

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Thin Films with Ultra-low Thermal Expansion

Namiko Yamamoto, Eleftherios Gdoutos, Risaku Toda, Victor White, Harish Manohara, and Chiara Daraio*

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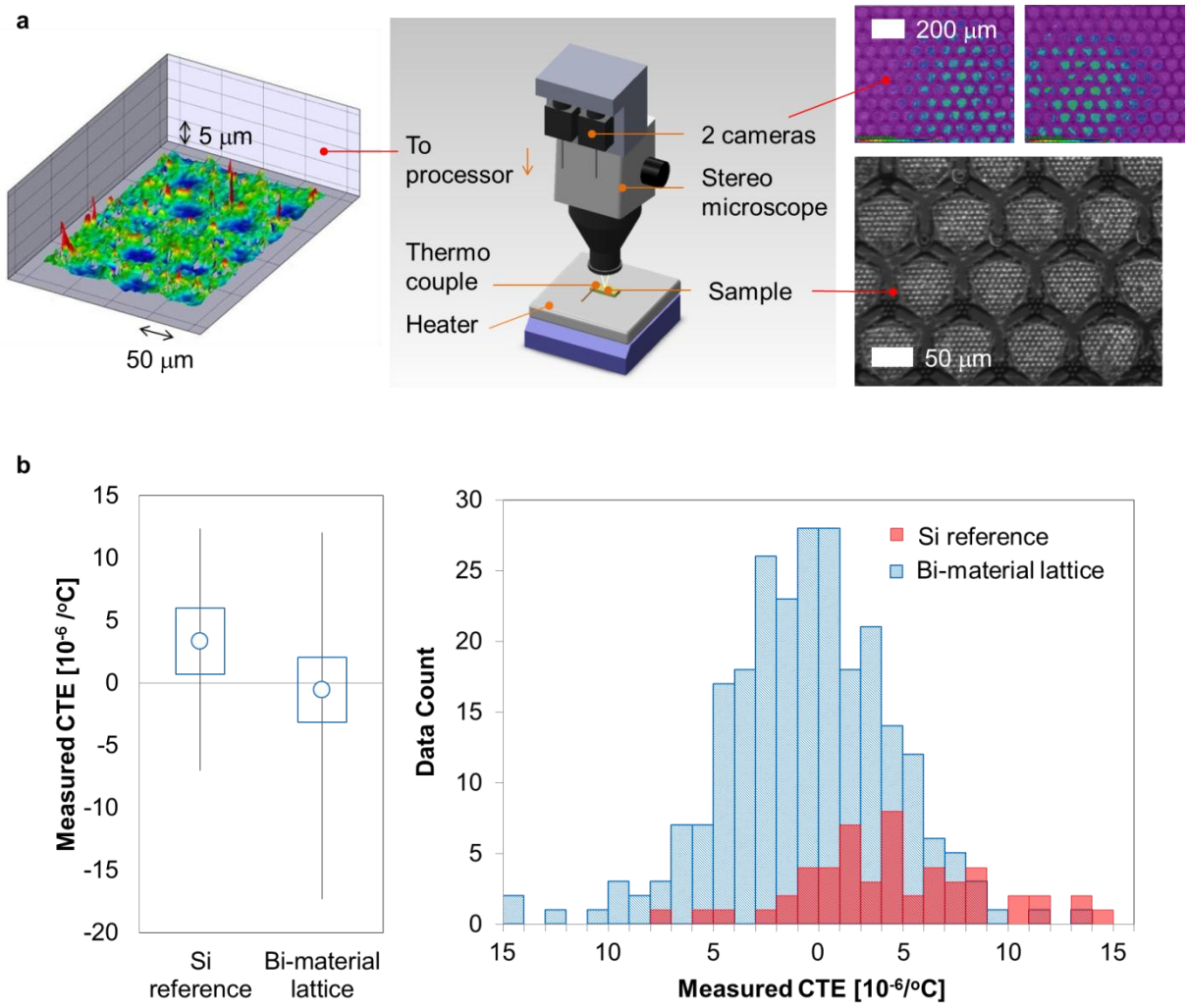

Figure S1. 3D digital image correlation (DIC) with a stereomicroscope. The CTEs of bi-metallic lattices were measured using the DIC technique. The center schematic shows the experimental set-up consisting of a stereomicroscope, heater, and two cameras. Right bottom is a stereomicroscope image showing a sample prepared with speckle patterns, and right top

are exemplary images taken on the same sample spot from different angles using the two cameras. Left is a 3D image constructed based on the two images showing the out-of-plane displacements. **b**, Data distribution of the DIC technique were evaluated by measurement on a bulk Si reference sample. While relatively large CTE data distribution was observed, the median measurement values were within the error range of ~$0.5\times10^{-6}/^{o}$C of the reference or simulated value.

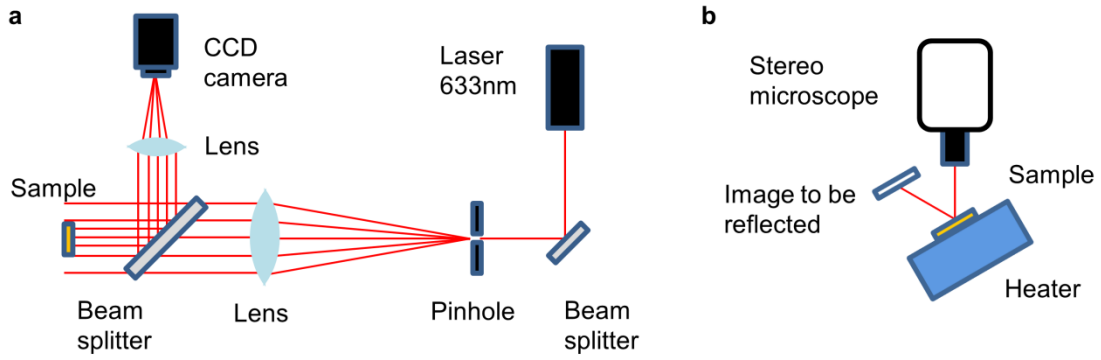

Figure S2. Experimental set-ups to characterize optical property of a bi-metallic lattice. **a**, Diffraction patterns of a bi-metallic lattice was observed by applying a collimated light on the lattice and then focusing the reflected light onto a CCD camera. **b,** Thermal stability of a bi-metallic lattice's imaging was evaluated by observing changes of reflected image focus during heating. By changing the working distance of the stereomicroscope, the sample or the reflected images were captured and compared.