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Evolution between metastable strain glass state and stable martensitic phase in TiNi alloy YUANCHAO JI, XIAOBING REN, National Institute for Materials Science, XIANGDONG DING, Los Alamos National Laboratory — Phase transitions occur when the thermodynamic free energy of one phase is not lowest for varying some external conditions, such as temperature, pressure, and others. However, metastable glass states that falls out of equilibrium may be observed on continued cooling. Some frozen metastable states can be further spontaneously transformed into thermodynamic stable ones. The corresponding inverse process, from low temperature stable phase to glass state then to another high temperature stable phase upon heating, seems proving the glass state like the metastable state like in chemical reactions. Here we report the inverse freezing (strain glass state) does not occur for the first time. The lower temperature B19' martensite directly transforms into the higher temperature B2 parent phase and the strain glass also transforms B2 phase in the heating process, although the glass state is in the intermediate between B2 and B19' phases in the cooling process in TiNi single crystal. Completely different transformation sequence reveals the inverse glass transition is not necessary between two stable phases and helps us further deepen the understanding of glass transition.

[1] X. Ren, et. al., Philos. Mag. A 90, 141(2010).
[2] X. Ren, et. al., MRS Bull. 34, 838(2009).

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