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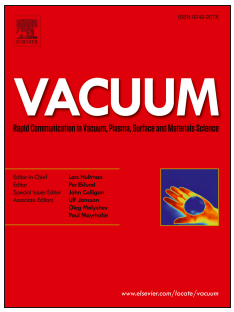

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Direct rapid prototyping of shape memory alloy with linear superelasticity via plasma arc deposition

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Abstract

Recently, additive manufacturing (AM) technology has drawn significant attention to fabricate shape memory alloys. In this study, plasma arc deposition (PAD), an AM technology, has been successfully applied to prepare the $Ti_{51}Ni_{49}$ alloy directly and rapidly at the first time. The synthesized PAD $Ti_{51}Ni_{49}$ alloy consisting of TiNi (B2), TiNi (B19') and Ti_2Ni phase, exhibited primary TiNi columnar dendrites structure with a certain number of Ti_2Ni phases distributed in the interdendritic regions. The as-deposited $Ti_{51}Ni_{49}$ alloy displayed a two-step phase transformation evidently (B2$\rightarrow$ R $\rightarrow$ B19') during cooling process, and special linear superelasticity (up to 4.5%) with narrow hysteresis due to Ti_2Ni phase embedded in TiNi matrix phase. This work suggests that the PAD is an effective technology to directly and

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