

Rheological characteristics of shape-memory structural liquids technology for 3D printing

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As a novel fabrication method, 3D printing technology has attracted a great attention for the next-generation manufacturing method since this is well suited to the production of complex structures. For successful process, not only the printing machines but proper materials are necessary. The structural liquids, which behave as either solids or liquids under specific stress or strain conditions, would be a desirable candidate to be applied to 3D printing. The structural liquids were prepared by using a self-assembly amide wax and compared with a high-viscosity materials (silicone putty) to identify the shape-memory capability using rheological test. It was confirmed that the key of shape-memory technology was a yield stress caused by the internal 3D network structures between internal molecular chains. The shape-memory structural liquids showed rheological behaviors suitable to a 3D printing technology.