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Programmable Hydrogels

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## Programmable Hydrogels

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**Abstract.** Programmable hydrogels are defined as hydrogels that are able to change their properties and functions periodically, reversibly and/or sequentially on demand. They are different from those responsive hydrogels whose changes are passive or cannot be stopped or reversed once started and vice versa. The purpose of this review is to summarize major progress in developing programmable hydrogels from the viewpoints of principles, functions and biomedical applications. The principles are first introduced in three categories including biological, chemical and physical stimulation. With the stimulation, programmable hydrogels can undergo functional changes in dimension, mechanical support, cell attachment and molecular sequestration, which are introduced in the middle of this review. The last section is focused on the introduction and discussion of four biomedical applications including mechanistic studies in mechanobiology, tissue engineering, cell separation and protein delivery.

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