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## Nanobiopolymers Fabrication and Their Life Cycle Assessments

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摘要	Living organisms produced nanopolymers (nanobiopolymers for short), such as nanocellulose, nanochitin, nanosilk, nanostarch, and microbial nanobiopolymers, having received widely scientific and engineering interests in recent years. Compare with petroleum-based polymers, biopolymers are sustainable and biodegradable. The unique structural features that stem from nanosized effects, such as ultrahigh aspect ratio and length-diameter ratio, further endow nanobiopolymers with high transparence and versatile processability. To fabricate these nanobiopolymers, a variety of mechanical, chemical, and synthetic biology techniques have been developed. The applications of the isolated nanobiopolymers have been extended from polymer fillers into wide emerging high-tech fields, such as biomedical devices, bioplastics, display panels, ultrafiltration membranes, energy storage devices, and catalytic supports. Accordingly, in the review, the authors first introduce isolation techniques to fabricate nanocellulose, nanochitin, nanosilk, and nanostarch. Then, the authors summarized the nanobiopolymers produced from biosynthetic pathway, including microbial polyamides, polysaccharides, and polyesters. On the other hand, most of these techniques require high energy consumption and usage of chemical reagents. In this regard, life cycle assessment offered a quantitative route to precisely evaluate and compare environmental benefits of different artificial isolation approaches, which are also summarized in the second section of the review.
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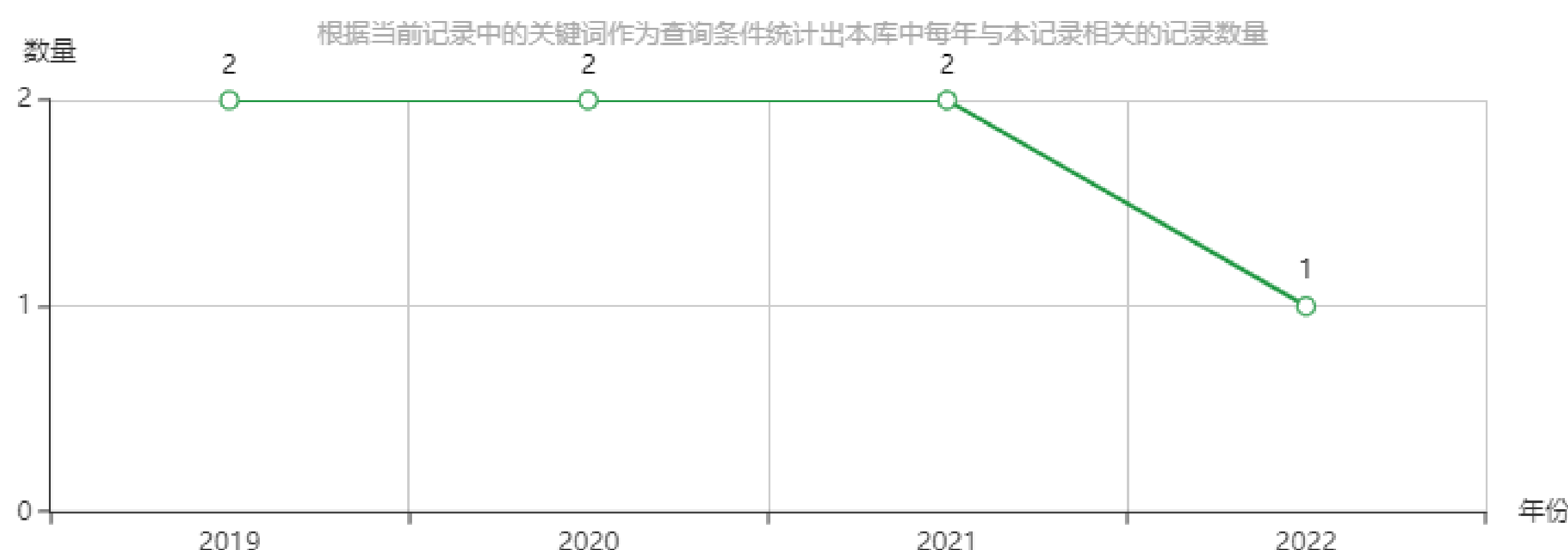
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