

March 25,2019

## Development of novel materials and technologies using structural proteins for use in the construction industry

— Initiation of a joint research agreement with Spiber Inc. with the aim of realizing a sustainable society —

Sumitomo Mitsui Construction Co., Ltd, hereinafter “SMCC” (President: Hideo Arai, Headquarters: 2-1-6, Tsukuda, Chuo-ku, Tokyo) and Spiber Inc., hereinafter “Spiber” (Representative Executive Officer: Kazuhide Sekiyama, Headquarters: 234-1 Mizukami Kakuganji Tsuruoka, Yamagata) have entered into a joint research agreement for the development of new materials and technology using structural proteins, focusing on potential applications in the construction industry.

In today’s society, companies should not only seek to lower the environmental impact of their businesses, but must also take into account the life-cycle of their products and services, while contributing to building a low-carbon, recycling-based society that coexists with nature. In accordance with these goals, Spiber’s structural proteins are produced through a fermentation process that uses plant resources as raw materials. Spiber’s proteins can then be processed into a wide variety of material forms such as fibers, resins, films, gels, and composites, which show great potential for use as sustainable core materials in a variety of fields starting from the apparel and automobile industries.

At SMCC, our mission is to build safe and comfortable communities and protect the lives of inhabitants and their surrounding natural environment. Thus, we aspire to nurture greater technical capacities in the architecture and construction industries, for the advancement of sustainable infrastructure engineering technologies such as living spaces with reduced environmental impact built using comfortable and highly durable concrete structures. The process of evolution has driven the creation and refinement of proteins that possess an abundance of characteristics and functions. With the development of synthetic biology technologies, we are now able to design and select protein combinations for specific applications, which could contribute to building a sustainable society and accelerate the creation of technologies and solutions that greatly exceed existing concepts and practices. Through this joint research, we aim to combine technologies and know-how from our respective fields and utilize Spiber’s versatile structural proteins and in-house technology to explore potential applications that could help achieve our goal of a sustainable future.

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## <Company Profile>

Name: Spiber Inc.

Headquarter: 234-1 Mizukami Kakuganji Tsuruoka, Yamagata

Representative Executive Officer: Mr.Kazuhide Sekiyama

Establishment: Sep 2017

Business Profile: Development of Biomaterials for new generation

Established in 2007, Spiber is a venture company that conducts cutting edge R&D devoted to the commercialization of sustainable structural protein materials as a new industrial cornerstone material. Spiber's co-founders, Kazuhide Sekiyama and Junichi Sugahara, began researching spider silk protein synthesis in 2004 at the Keio University Institute for Advanced Biosciences in Tsuruoka, Yamagata. Their efforts led to the development of Spiber's proprietary QMONOS® protein material, as well as the successful establishment of the world's first mass production techniques for its production.

Using their proprietary technology, Spiber can create a diverse range of proteins with different features and forms without relying on petroleum resources. With the construction of their large-scale fermentation plant in Thailand in progress, Spiber is moving closer to achieving mass production of its proprietary structural protein materials, and expects to commence commercial production from 2021.



Sample: Raw Materials using Structural Proteins made by Spiber Inc.

### ■ Structural Proteins developed by Spiber Inc.

Proteins, biopolymers which serve as some of the essential building blocks of life, are formed from straight-chain assemblies containing up to 20 types of amino acids. The characteristics of any one protein result from the order of these amino acids, and the process of evolution has driven the creation and refinement of the multitude of existing proteins which support life on Earth today.

Some proteins, such as enzymes and antibodies, are responsible for a variety of physiological functions within living creatures. Others, such as those found in the cytoskeleton of cells or in spider silk, play a more structural role. At Spiber, we call the latter type 'structural proteins'. Examples of structural proteins include keratin, found in hair and nails, and collagen, an important component in skin and bones.

Spiber's structural proteins are designed or selected from within an almost limitless pool of possible amino acid combinations, and then produced via a microbial fermentation process. In addition, Spiber's proprietary technology allows for the creation of a hugely diverse range of proteins, each with different features and forms, without petroleum as the primary raw material.