

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau

(43) International Publication Date  
19 September 2024 (19.09.2024)



(10) International Publication Number  
**WO 2024/192180 A1**

(51) International Patent Classification:

*A23D 9/007* (2006.01) *A23L 33/19* (2016.01)  
*A23D 9/02* (2006.01) *A61K 8/04* (2006.01)  
*A23L 13/40* (2023.01) *A61K 8/64* (2006.01)  
*A23L 29/206* (2016.01) *A23D 7/005* (2006.01)  
*A23L 33/17* (2016.01) *A23J 3/22* (2006.01)  
*A23L 33/185* (2016.01) *A23J 3/24* (2006.01)

18/199,974 22 May 2023 (22.05.2023) US  
18/473,245 24 September 2023 (24.09.2023) US  
63/552,688 13 February 2024 (13.02.2024) US

(71) Applicant: **SHIRU, INC.** [US/US]; 850 Marina Village Pkwy, Alameda, CA 94501 (US).

(72) Inventors; and

(71) Applicants: **LEVERENZ, Ryan** [US/US]; c/o Shiru, Inc., 850 Marina Village Pkwy, Alameda, CA 94501 (US). **ATIK, Carl** [US/IL]; c/o Shiru, Inc., 850 Marina Village Pkwy, Alameda, CA 94501 (US). **KIM, Alina** [US/US]; c/o Shiru, Inc., 850 Marina Village Pkwy, Alameda, CA 94501 (US). **KIRK, Elizabeth** [US/US]; c/o Shiru, Inc., 850 Marina Village Pkwy, Alameda, CA 94501 (US). **MEN-NAH-GOVELA, Yamile** [MX/US]; c/o Shiru, Inc., 850 Marina Village Pkwy, Alameda, CA 94501 (US). **MYERS, Janelle** [US/US]; c/o Shiru, Inc., 850 Marina Village Pkwy, Alameda, CA 94501 (US). **VOOGT, Jason** [US/US]; c/o

(21) International Application Number:

PCT/US2024/019810

(22) International Filing Date:

13 March 2024 (13.03.2024)

(25) Filing Language:

English

(26) Publication Language:

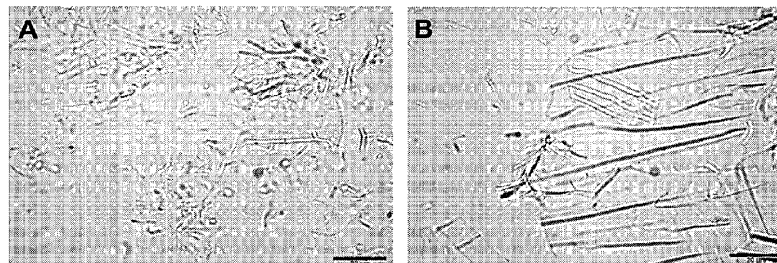
English

(30) Priority Data:

63/451,645 13 March 2023 (13.03.2023) US

(54) Title: STRUCTURED PROTEIN PARTICULATE IN FIBRE OR SHEET FORM THAT FORMS OLEOGELS AND MACROCOLLOIDS FOR REPLACING FATS AND THICKENERS IN FOOD AND COSMETIC PRODUCTS

FIG. 1



(57) Abstract: This disclosure provides a protein dry particulate that has a defined microstructure with beneficial properties. When combined with aqueous solution, the dry particulate forms a macrocolloid with improved thickening and stabilizing properties. When combined with an oil, the dry particulate forms an oleogel with unique oil structuring and release properties. The microstructure is in the form of fibrils, sheets, or other particles that are substantially not interconnected and have a high aspect ratio. The dry particulate can be manufactured by denaturing the protein in an aqueous liquid, and organizing the protein by freeze channeling. The oleogel can be manufactured by gradually and gently adding a suitable oil so as not to triturate the microstructure. The oleogel releases some but not all of the oil when heated, and forms a spreadable emulsion in an aqueous liquid that is stable for at least six weeks. The oleogel

[Continued on next page]

WO 2024/192180 A1

Shiru, Inc., 850 Marina Village Pkwy, Alameda, CA 94501 (US).

(74) **Agent: SCHIFF, Michael;** Attorney at Law, 808 Coleman Ave., Suite 19, Menlo Park, CA 94025 (US).

(81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

**Published:**

— *with international search report (Art. 21(3))*

can replace animal fats and tropical oils in foods, cosmetics, and pharmaceuticals.