SUPPLEMENTARY MATERIALS

Table S1: sunscreen filters and relative concentrations used to prepare the mixtures inserted in the samples with a protection factor SPF of 15, 30 and 50 calculated with the Sunscreen Simulator software by BASF.

INCI NAME	w/w %		
Bis-Ethylhexyloxyphenolmethoxyphenyl Triazine	3	5	8
Diethylaminohydroxybenzoylhexyl Benzoate	3	5	8
Ethylhexyltriazon	1.5	3	4.5
Butylmethoxydibenzoylmethane	1.5	2	3
Calculated SPF	17.3	31.4	50
Final theretical SPF	15	30	50

Table S2: formulation scheme of emulsions stabilized by Zea mays starch (A) and Zinc oxide (Z), and relative concentration ranges used. A was dispersed in water phase under stirring at 40 °C, while Z was dispersed in oil phase at 45 °C. When completely dispersed, phase 1 was introduced into phase 2 under the action of Silverson L5T.

		A O series (w/w %)	Z O series (w/w %)	AZ O series (w/w %)
PHASE 1	Water	qb. 100	qb. 100	qb. 100
	Glycerin	4	4	4
	Zea mays starch (A)	5 - 15	/	2.5 - 7.5
PHASE 2	Zinc oxide (Z)	/	5 - 15	2.5 - 7.5
	Dicaprylyl carbonate, Caprylic/capric triglyceride (O)	20 - 40	20 - 40	20 - 40

Table S3: formulation scheme of emulsions stabilized by ternary association of Zea mays starch (A), Zinc oxide (Z) and Xanthan gum (X), Sclerotium gum (S) and Diutan gum (D) and relative concentration ranges used. The polysaccharides were dispersed in phase 1 at 40 °C. Phase 2 was heated at 45 °C and introduced into phase 1 under the action of Silverson L5T.

		AZ10 X series (w/w %)	AZ10 S series (w/w %)	AZ10 D series (w/w %)
PHASE 1	Water	qb. 100	qb. 100	qb. 100
	Glycerin	4	4	4
	Xanthan gum (X)	0.1 - 0.5	/	/
	Succinoglycan (S)	/	0.1 - 0.5	/
	Diutan gum (D)	/	/	0.1 - 0.5
	Zea mays starch (A)	5	5	1.7 - 8.3
PHASE 2	Zinc oxide (Z)	5	5	1.7 - 8.3
	Dicaprylyl carbonate, Caprylic/capric triglyceride (O)	10	10	10 - 40

Table S4: formulation scheme of emulsions stabilized by ternary association of Zea mays starch (A), Zinc oxide (Z) and and Diutan gum (D) with different emollients and relative concentrations used. Phase 2 (45 °C) was introduced in Phase 1 (40 °C) under the action of Silverson L5T at 4500 rpm for 5 minutes.

		AZD O1 (w/w %)	AZD O2 (w/w %)	AZD O3 (w/w %)	AZD O4 (w/w %)	AZD O5 (w/w %)	AZD O6 (w/w %)	AZD O7 (w/w %)
PHASE 1	Water	qb. 100	qb. 100	qb. 100	qb. 100	qb. 100	qb. 100	qb. 100
	Glycerin	4	4	4	4	4	4	4
	Diutan gum (D)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Zea mays starch (A)	5	5	5	5	5	5	5
PHASE 2	Zinc oxide (Z)	5	5	5	5	5	5	5
	Dicaprylyl carbonate	10	/	/	/	/	/	/
	Dicaprylyl ehter	/	10	/	/	/	/	/
	Caprylic/capric triglyceride	/	/	10	/	/	/	/
	Dimethicone	/	/	/	10	/	/	/
	Hydrogenanted polydecene	/	/	/	/	10	/	/
	Simmondsia chinensis seed oil	/	/	/	/	/	10	/
	Dibutyl adipate	/	/	/	/	/	/	10

Table S5: formulation scheme of emulsions stabilized by ternary association of Zea mays starch (A), Zinc oxide (Z) and and Diutan gum (D) with the introduction of different preservative molecules and relative concentrations used. Phase 2 (45 °C) was introduced in Phase 1 (40 °C) under the action of Silverson L5T at 4500 rpm for 5 minutes. Caprylyl glycol (P1) and Pentylen glycol (P2) have been introduced into phase 1 before emulsification; Capryloyl glycine and Undecylenoyl glycine (P4) have been introduced into phase 2 before emulsification; Phenoxyethanol and Ethylhexylglycerin (P3) was introduced after emulsification at temperature lower than 40 °C.

		AZD P1 (w/w %)	AZD P2 (w/w %)	AZD P3 (w/w %)	AZD P4 (w/w %)
PHASE 1	Water	qb. 100	qb. 100	qb. 100	qb. 100
	Glycerin	4	4	4	4
	Diutan gum (D)	0.1	0.1	0.1	0.1
	Zea mays starch (A)	5	5	5	5
	Caprylyl glycol	**0.5**	/	/	/
	Pentylene glycol	/	**0.3**	/	/
PHASE 2	Zinc oxide (Z)	5	5	5	5
	Capryloyl glycine	/	/	/	**0.1**
	Undecylenoyl glycine	/	/	/	**0.1**
	Dicaprylyl carbonate, Caprylic/capric triglyceride	10	10	10	10
PHASE 3	**Phenoxyethanol, Ethylhexylglycerin**	/	/	**1**	/

Table S6: formulation scheme of emulsions stabilized by ternary association of Zea mays starch (A), Zinc oxide (Z) and and increasing concentrations of Diutan gum (D) with the introduction of 2.5 % w/w of pigments. Phase 2 (45 °C) was introduced in Phase 1 (40 °C) under the action of Silverson L5T at 4500 rpm for 5 minutes. Phase 3 was introduced after emulsification at temperature lower than 40 °C.

		AZ D01 Y (w/w %)	AZ D02 Y (w/w %)	AZ D03 Y (w/w %)
PHASE 1	Water	qb. 100	qb. 100	qb. 100
	Glycerin	4	4	4
	Diutan gum (D)	0.1	0.2	0.3
	Zea mays starch (A)	5	5	5
PHASE 2	Pigment mixture (Y)	2.5	2.5	2.5
	Zinc oxide (Z)	5	5	5
	Dicaprylyl carbonate, Caprylic/capric triglyceride (O)	10	10	10
PHASE 3	Phenoxyethanol, Ethylhexylglycerin	1	1	1

Table S7: formulation scheme of emulsions stabilized by ternary association of Zea mays starch (A), Zinc oxide (Z) and and increasing concentrations of Diutan gum (D) and different amounts of sun filters mixture (U), to achieve SPF 15, 30 and 50. The ratio between the filter mixture U and the oily phase was kept fixed at 1:1. Phase 2 (45 °C) was introduced in Phase 1 (40 °C) under the action of Silverson L5T at 4500 rpm for 5 minutes. Phase 3 was introduced after emulsification at temperature lower than 40 °C.

		AZD U1 SPF 15 (w/w %)	AZD U2 SPF 30 (w/w %)	AZD U3 SPF 50 (w/w %)
PHASE 1	Water	qb. 100	qb. 100	qb. 100
	Glycerin	4	4	4
	Diutan gum (D)	0.1	0.1	0.1
	Sodium Chloride	0.05	0.05	0.05
	Zea mays starch (A)	5	5	5
PHASE 2	Zinc oxide (Z)	5	5	5
	Sunscreen filters (U)	9	15	23.5
	Dicaprylyl carbonate, Caprylic/capric triglyceride (O)	9	15	23.5
PHASE 3	Phenoxyethanol, Ethylhexylglycerin	1	1	1