Synthesis and Characterization of Functional Component-Containing Lotion by Double Emulsion Method

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Abstract

Skin care and beauty products have been highly valued and considered lucrative segments of the cosmetics industry. However, the products available on the market lack vehicles that are small enough to aid in the absorption of functional components/ingredients through the skin. Improving the absorption of these components/ingredients through the skin would definitely lead to a reduction in the cost of production. Given its excellent anti-oxidative and anti-microbial properties, resveratrol serves as an important functional ingredient candidate. In this study, the skin lotion, which was prepared by the emulsion method, was used as the carrier to enhance the absorption of resveratrol. Our transmission electron microscopy (TEM) and dynamic light scattering (DLS) results revealed that the particles produced were of several hundred nanometers in diameter, which are smaller than those found in the commercial skin care products currently available on the market. We believe the particles synthesized in this work can be readily absorbed by the skin, thereby decreasing the amount needed to be applied to the skin.

Materials and Methods

Materials

Outer water phase(W_o)

Content	Function
Germall-115	Preservative
Amigel 1%	Thickener
Rose floral water	Perfume
Tween-80/Tween-60/Tween-20	Surfactant
Deionized water	Solvent

Oil phase(O)

Content	Function
Stearic acid	Emollient
Span-60/Span-20	Surfactant
Stearyl alcohol	Stabilizer
Mineral Oil	Humectant
Uniphon P-23	Preservative
Vit.E Acetate	Antioxidant

Inner water phase(W_i)

Content	Function
Ethanol/Deionized Water	Solvent
Tween-80	Surfactant
NaCl	Stabilizer
Resveratrol	Antioxidant

Method
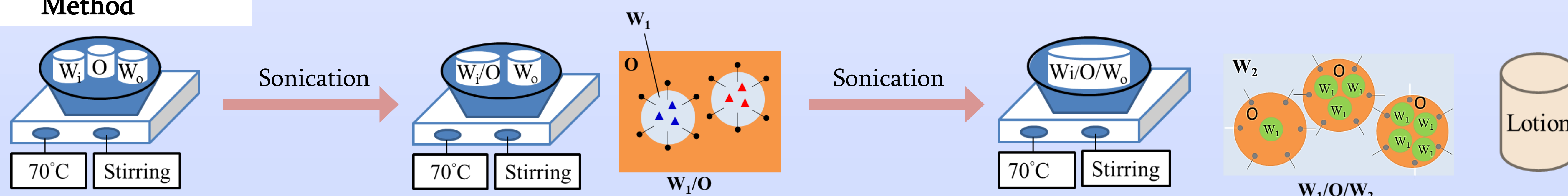
Results

1. Results of critical micelle concentration(CMC) measurement of (a) Tween-80 in ethanol-water co-solvent (b) Tween-80 in water
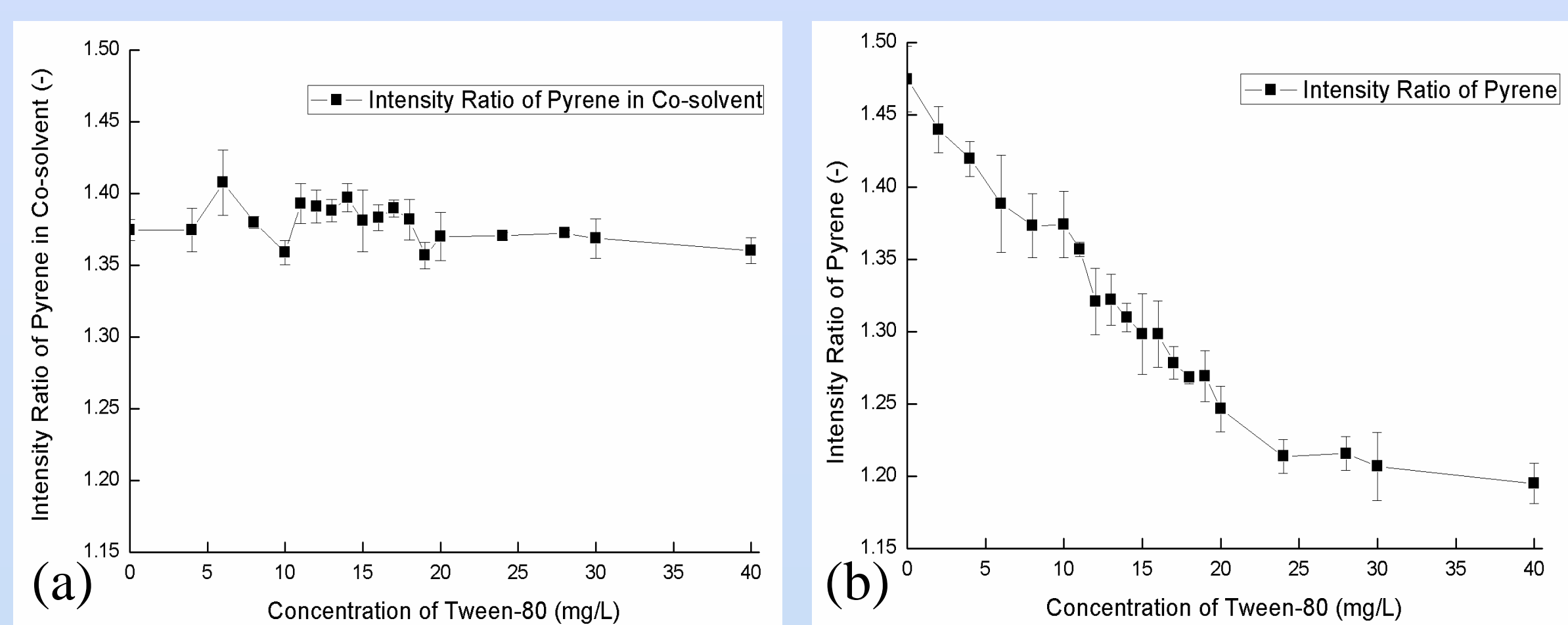
2. Variables tested in this study

0.95% Span-20/60
1.5% Tween-80/60/20
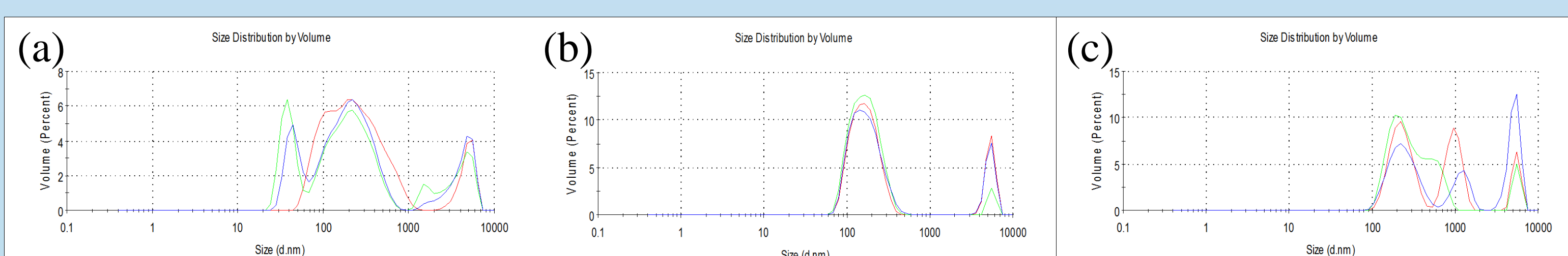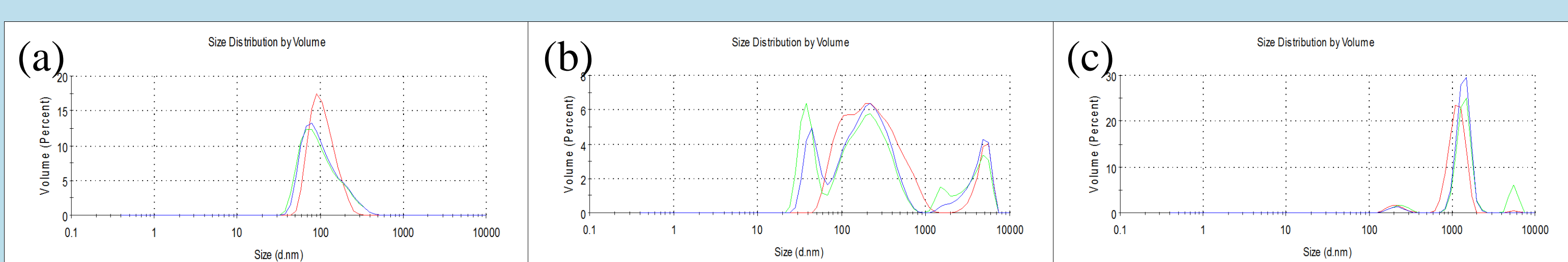Resveratrol 0.004%
$W_i/O/W_o$=2:8:90

| Resveratrol	Tween	Span	Sonication time

3. Dynamic light scattering (DLS) images of the particles produced at different resveratrol concentration: (a) 0.04 g resveratrol/L lotion (b) 0.2 g resveratrol/L lotion (c) 0.4 g resveratrol/L lotion


4. Dynamic light scattering (DLS) images of particles produced at different oil-to-water ratio: (a) 5:95 (b) 10:90 (c) 30:70

5. Dynamic light scattering (DLS) images of the particles produced at different second sonication times: (a) 5 minutes (b) 10 minutes (c) 20 minutes (d) 40 minutes
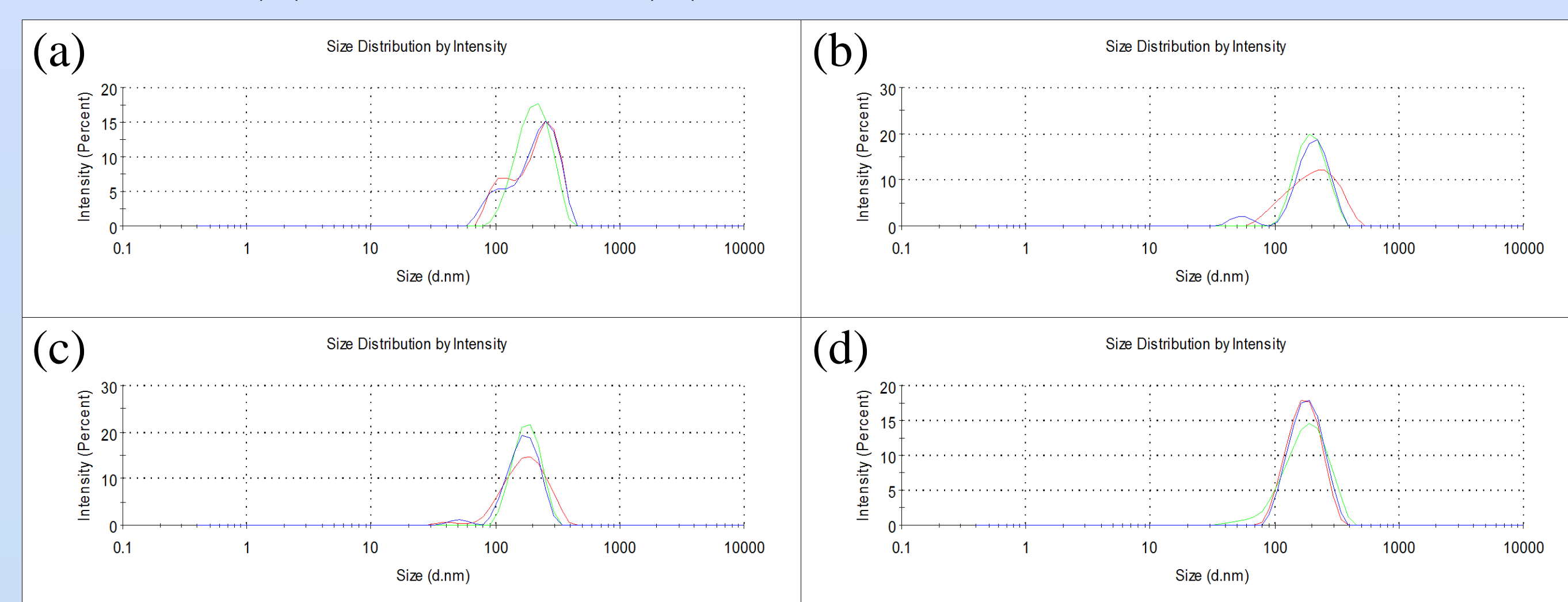
6. TEM images of the particles produced with different second sonication times: (a) 5 minutes (b) 10 minutes (c) 40 minutes
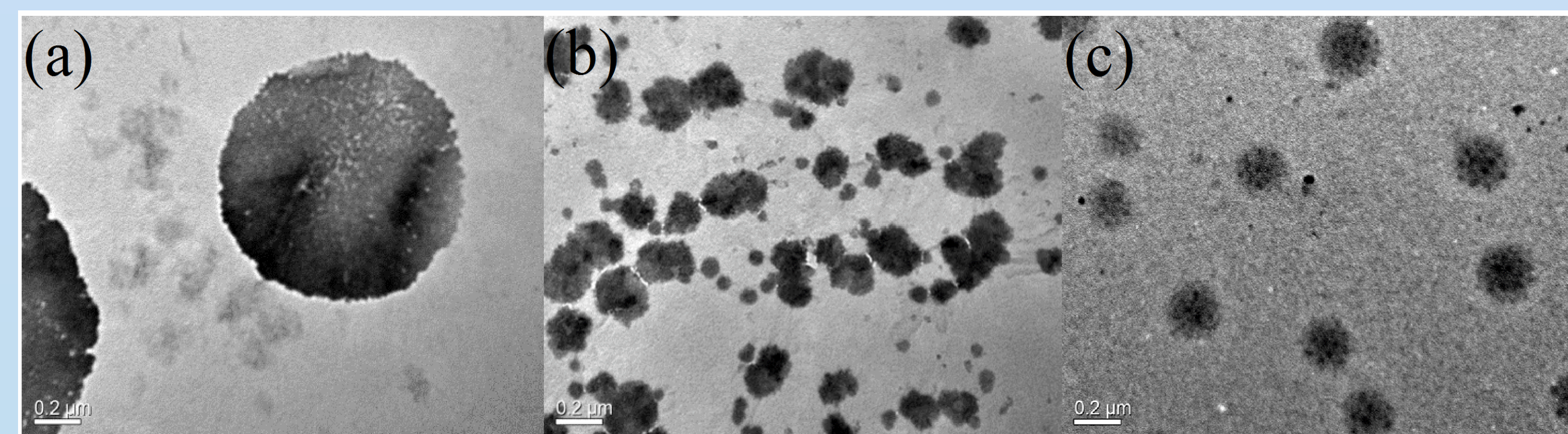
§ Conclusion

1. We found that, when ethanol was added inside, it was more difficult to stabilize the water-oil surface in the inner water phase.
2. DLS results demonstrated that the optimal concentration was 0.2 g resveratrol in a liter of lotion.
3. The oil-to-water ratio affected the dispersion and size of particles. As ratio increased, the particles became larger and dispersed.
4. Both TEM and DLS results showed that the size of particles was considerably influenced by the second sonication time.

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