



VCU

VIRGINIA COMMONWEALTH UNIVERSITY

“Rapid, Room-Temperature Conversion of Nanoparticle Dispersions for Long-term Storage” VCU #16-091

Applications

- Chemotherapeutics
- Drug delivery
- Consumer products which require encapsulation

Advantages

- Increased shelf-life without refrigeration
- Maintains size of nanoparticles
- Rapid, low energy redispersion
- Maintains acceptable osmolarity for injection

Inventors

[Christina Tang, Ph.D.](#)
Shani Levit

Contact

Afsar Q. Mir, MS
Technology Manager
miraq@vcu.edu
Direct 804-827-2213

Technology Summary

Polymeric nanoparticle (NP) formulations offer advantages over free drug; however, stability of the nanoparticle dispersions is a significant obstacle and drying is often required for long-term storage and size stability. The main limitation of freeze-drying and spray-drying methods is particle aggregation upon reconstitution which can be overcome with sonication (impractical in a clinical setting) or large amounts of cryoprotectants (resulting in hypertonic dispersions).

Researchers at VCU have developed a technique which rapidly and continuously converts nanoparticles to a dry, stable form via electrospinning. This technique allows for stable nanoparticle dispersions with increased shelf-life and portability at room-temperature. Reconstitution of particles is rapid and can be done in a clinical setting (no lab equipment required) while maintaining nanoparticles size (less than 200nm) without aggregation.

	Storage temperature	Difference in size after 7 months storage (%)
Nanoparticles in solution	4°C	54%
Dried Nanoparticles	~23°C	4%

The table shown represents the difference in particle size between one day of storage and after 7 months. Notably, for the original nanoparticle dispersion stored at 4°C for 7 months, there was a 54% increase in diameter likely due to Ostwald ripening. In dry form, nanoparticles could be stored for at least 7 months at room temperature with no significant change in size. Therefore, NP storage in nanofibers enables storage of the nanoparticle formulations at room temperature avoiding the need for cold chain storage.

Technology Status

Proof-of-concept testing complete with positive results
Patent Pending: U.S. and Foreign Rights available

This technology is available for licensing to industry for further development and commercialization.