
# Localized Delivery of Nucleic Acid by Polyelectrolyte Assemblies

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing ultrathin, multilayered polyelectrolyte films that permit the localized delivery of nucleic acids to cells from the surfaces of implantable materials.**

## OVERVIEW

Thin films and coatings that allow the sustained release of DNA from surfaces play an important role in the development of localized approaches to gene therapy. For example, polymer-coated intravascular stents have been used to localize delivery of DNA to the vascular wall and could lead to innovative gene-based treatments for vascular diseases.

However, existing devices are coated with relatively thick films of polymers, which can lead to inflammatory responses *in vivo*. They also utilize DNA encapsulation methods that provide limited control over DNA loading and the spatial distribution of the encapsulated DNA.

## THE INVENTION

UW-Madison researchers have developed ultrathin, multilayered polyelectrolyte films that permit the localized delivery of nucleic acids to cells from the surfaces of implantable materials. To form the polyelectrolyte coating, nucleic acids and polycations are deposited layer-by-layer onto the surface of an implantable device. After implantation, nucleic acids are delivered only to the cells in direct contact with the device surface. The polyelectrolyte film promotes the direct and self-sufficient transfection of those cells to enable local production of therapeutic agents.

## THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.

## APPLICATIONS

- Localized gene therapy
- Growth and regeneration of complex tissues
- Inhibition of the inflammation that occurs when medical devices are implanted
- Implantable materials and devices, including sutures, stents, pacemakers, defibrillators, artificial joints, prostheses, neurostimulators, indwelling catheters or insulin pumps

## KEY BENEFITS

- Ultrathin, conformal films can be deposited on devices with complex geometries.
- Promotes localized gene expression without requiring additional transfection agents
- Process can be used to incorporate and release multiple nucleic acid constructs.
- Composition of the nucleic acid and polycation layers can be varied to adjust the degradation rate of each layer within the film.
- Allows spatial and temporal control over the release of DNA
- Neither the nucleic acid nor the film is exposed to organic solvents that could remain in these materials after fabrication.

## ADDITIONAL INFORMATION

### Publications

Saurer E.M., Flessner R.M., Sullivan S.P., Prausnitz M.R. and Lynn D.M. 2010. Layer-by-Layer Assembly of DNA- and Protein-Containing Films on Microneedles for Drug Delivery to the Skin. Biomacromolecules 11, 3136–3143.

### Tech Fields

Medical Devices - Device coatings
Drug Discovery - Drug delivery

## CONTACT INFORMATION

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