



# Semi-solid polymer drug delivery system

**A polymer-based material that is semi-solid material at room and physiological temperatures enabling easy formulation of drugs (e.g. by simple mixing) and delivery (e.g. topical cream).**

**IP Status:** US Patent Issued; **Application #:** 10,179,173

## Applications

- Drug delivery system - pharmaceutical and skin care products
- Sustained release of small and large molecules

## Key Benefits & Differentiators

- Semi-solid material can be included in minimally invasive injections and as topical cream
- Both hydrophobic and hydrophilic drugs can be loaded; compatible with small molecules as well as macromolecules
- Tunable polymer chemistry enables fine tuning of release rates based on payload type
- Synthesized from biocompatible building blocks

## Controlled Drug Release for Topical Creams and Injections

Many patients with chronic diseases often require multiple injections to administer the required dose of a medication. Many treatments of acute to chronic diseases require multiple injections to be administered to maintain drug levels. However, patient compliance with such a treatment regime is difficult to achieve if the patient has to return to the clinic multiple times or has to administer injections at home. Polymers with controlled drug release could be a solution to this treatment hurdle. If these treatments can be given in a single injection that lasts days to weeks, the success rate of the treatment will increase.

Researchers at the University of Minnesota have created a novel polymer-based drug delivery system with a controllable release rate that could be used to improve patient compliance. The polymer chemistry involved in the synthesis of the material allows for easy tuning of drug release to suit different application requirements. The new material is semi-solid and can be easily included in topical creams or injections by simple mixing. The drug delivery system is capable of loading a wide range of drugs either hydrophobic or hydrophilic, including small molecule drugs and macromolecular drugs. The polymer and its byproducts are biocompatible.

## Phase of Development

### TRL: 4

Proof of concept in vivo. Researchers have synthesized the material and characterized its release properties. No toxicity to cells in vitro and no adverse tissue response in vivo (in mice) have been found.

## Desired Partnerships

This technology is now available for:

## Technology ID

20120102

## Category

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Sciences/Materials  
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Life Sciences/Pharmaceuticals  
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### Researchers

- [Chun Wang, PhD](#), Associate Professor, Department of Biomedical Engineering

### References

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2. Zhao, Peng, Lixin Liu, Xiaoqin Feng, Chun Wang, Xintao Shuai, and Yongming Chen. , <https://doi.org/10.1002/marc.201200172>, Macromolecular rapid communications 33, no. 16 (2012): 1351-1355.