

## Contact

Brian Wright  
Auburn University  
Office of Technology Transfer  
334-844-4977  
brian.wright@auburn.edu  
http://ott.auburn.edu/  
Reference: Carpet Recycling

## Inventors



*Dr. Chris Roberts*  
Department Chair & Professor  
Department of Chemical  
Engineering

*Aron Griffith*  
Masters Graduate  
Department of Chemical  
Engineering

## References

- Park, Y., et al; "Formation of Nylon particles and fibers using precipitation with a compressed antisolvent"; *Ind. Eng. Chem. Res.*; 2002; 41: 1504-1510
- Griffith, A. T., et al; "Separation and recovery of nylon from carpet waste using a supercritical fluid antisolvent technique."; *Polymer - Plastic Technology Eng.*; 1999; 38 (3): 411-431

[Click here for a listing of Auburn's available physical science technologies](#)

Auburn University is an equal opportunity educational institution/employer.

## Cost Efficient Recovery of Nylon from Recycled Carpet

### Overview

Auburn University is seeking a licensee or development partner for an invention that separates nylon from post-industrial or post-consumer carpet waste and makes it available for recycling. This recycling technology has potential applications in:

- Carpet and textile industries
- Chemical and polymer industries
- Nylon recycling industry

### Advantages

- Recovered nylon retains similar properties as compared to virgin nylon
- Economic analysis indicates that an 18 MM lb/yr plant could produce recycled nylon economically, with a capital recovery period of less than three years
- Use of formic acid and CO<sub>2</sub> eliminate the need for more hazardous solvents
- Solvents are recycled in a closed-loop process, reducing waste and cost
- Process is highly scalable
- Process can be modified to separate other polymers from such materials as wood, paper, metal, glass or even other polymers

### Description

With the continued increase in the production of polymers, there is an urgent need for recycling for three important reasons: 1) the increasing costs of manufacturing virgin polymers due to rising oil prices; 2) manufacturing requires the use of precious natural resources that are in diminishing supply; and 3) most polymers are virtually non-biodegradable.

Recycling becomes much more complex and expensive once polymers are combined with other materials, often becoming more expensive than landfill disposal and production of new product from virgin materials. Due to a lack of an economical recycling process, an estimated 4.7 billion pounds of carpet were discarded in 2002. A clear need exists for an economical process for recycling of polymers contained in mixed materials. Our process is more cost efficient than the existing processes for recycling nylon from carpets.

In our process, the nylon is selectively dissolved into formic acid. The solvent and polymer solution is then mixed with a compressed antisolvent (supercritical CO<sub>2</sub>) in which the polymer is insoluble. The nylon precipitates from the solution and can then be recovered. Both the solvent and antisolvent are recycled in this continuous process.

Auburn's economic analysis and discussions with a major engineering design firm indicate that this process could be profitable under several different scenarios.

### Status

- United States Patent Number 5,994,417
- This invention has been successfully verified by laboratory experiment
- Initial economic analysis of carpet recycling suggests good profitability
- A pilot plant is anticipated

### Licensing Opportunities

- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or a joint venture