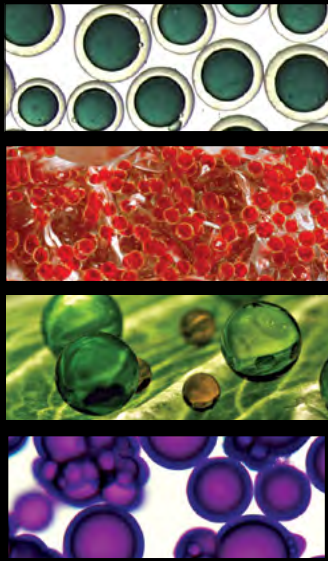


The background of the entire image is a dense field of colorful, translucent microcapsules in various sizes and colors, including red, green, blue, purple, and yellow. A large white circle is centered on the page, containing several individual microcapsules of different colors (red, green, blue, purple) scattered across its surface. The text is overlaid on this white circle.

MICRO/NANO **encapsulation**

SOUTHWEST RESEARCH INSTITUTE®



Southwest Research Institute

Founded in 1947 as an independent, nonprofit research and development organization, Southwest Research Institute provides a significant research, engineering and testing resource for industry, business and government. The Institute uses a multidisciplinary, integrated approach to solving complex problems in science and applied technology. As part of a long-held tradition, patent rights arising from sponsored research at the Institute are often assigned to the client. SwRI generally retains the right to Institute-funded advancements.

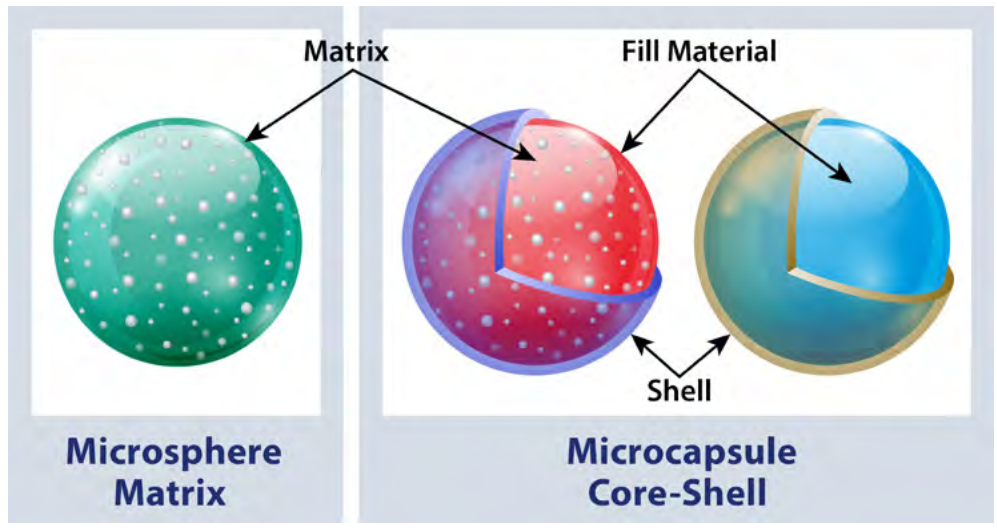
SwRI maintains Controlled Substance Registrations with the Drug Enforcement Administration permitting the Institute to handle controlled substances for the business activity of research and manufacturing.

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encapsulation

For more than 70 years, Southwest Research Institute® (SwRI®) has been a leader in encapsulation. SwRI has conducted thousands of encapsulation, micronization, and particle engineering projects for numerous clients, spanning a wide variety of application areas. Institute personnel are experienced with over two dozen encapsulation techniques to produce capsules and particles with sizes from tens of nanometers to several millimeters. The encapsulation technique and formulation selected are based on the needs of the specific application to assist with solving product stability, control release, or other challenges for clients in both academia and industry.



Microsphere Matrix

Microcapsule Core-Shell

facilities

Facilities

- cGMP facilities
- FDA-inspected
- ISO 9001:2015
- DEA registered
- Potent material handling
- BSL 1 & 2 labs



Sizes

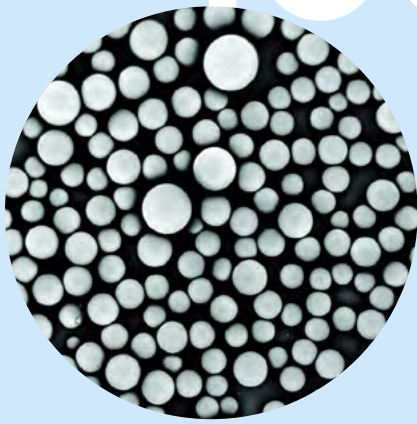
Nanometers to millimeters

Scale

- Lab to pilot
- Milligrams to kilograms



techniques



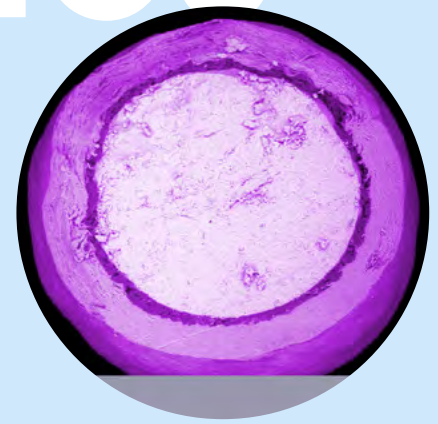
Emulsions

- Monodisperse
- Coacervation
- Interfacial polymerization
- Solvent extraction/evaporation



Atomization

- Monodisperse
- Spray drying
- Spinning disc
- Inert, electrostatic, solvents, melts

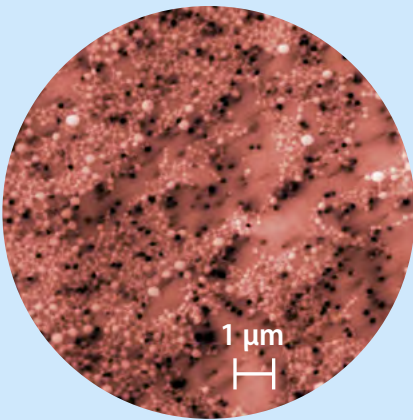


Spray Coating

- Fluid bed
- Pan coating
- Inert, solvents, melts

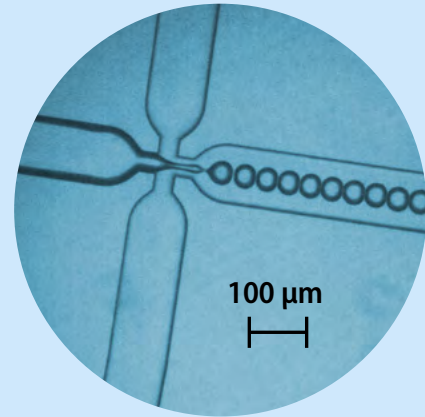
Coextrusion

- Vibratory nozzles
- Microfluidic chips
- custom systems



Nanoencapsulation

- Liposomes
- SLNs, LNPs
- Polymeric NPs
- Micelles
- Cyclodextrins



Product Characterization

- Extensive biological, chemical & physical analysis tools
- Release testing
- Stability testing



Applications

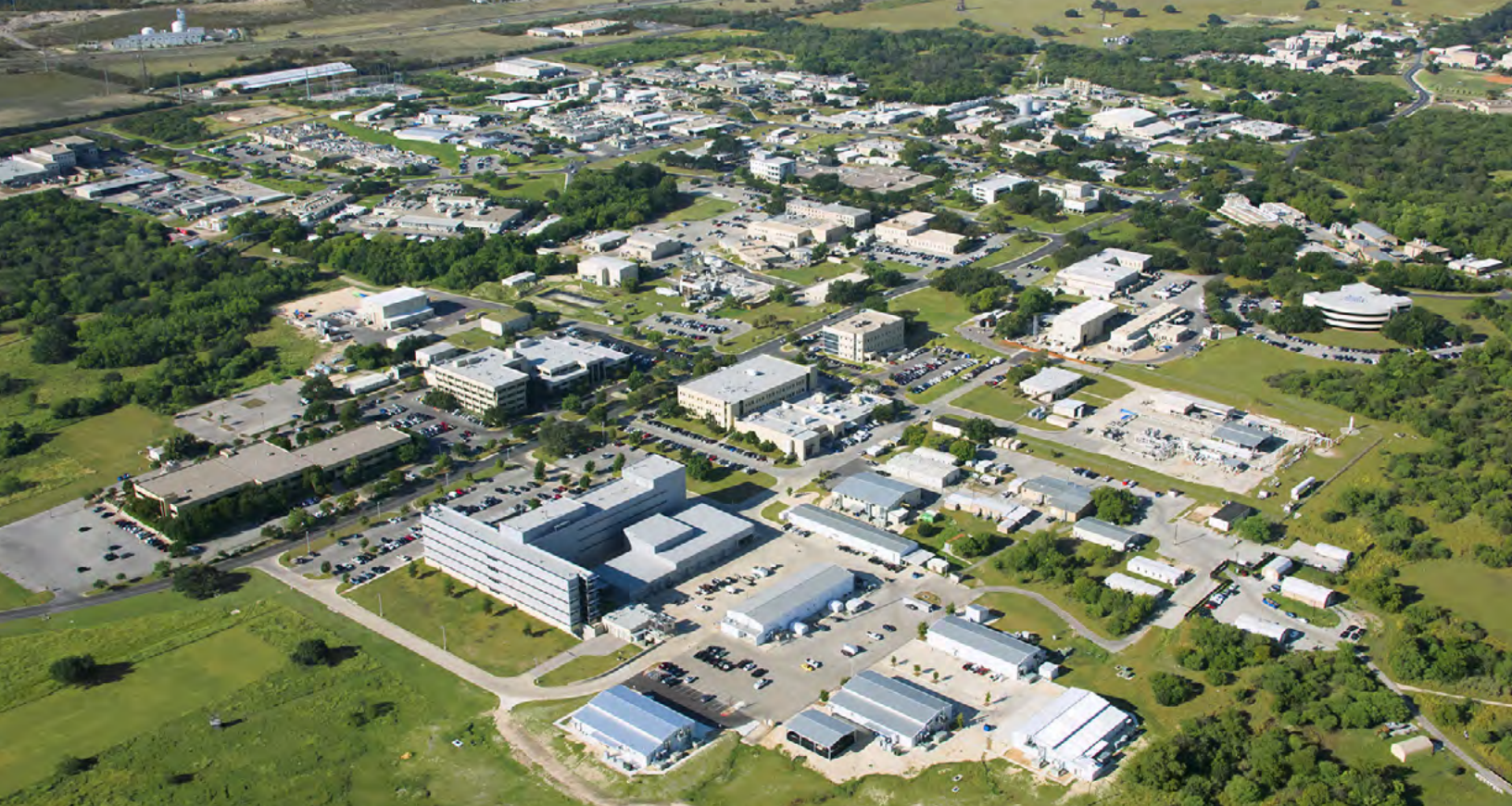
- Pharmaceuticals
- Nutraceuticals
- Food
- Consumer products
- Paints & coatings
- Agricultural

Other Capabilities

- Hot melt extrusion
- Milling
- Synthesis
- Molecular modeling
- Finished dosage forms
- Cell cultures



applications



Southwest Research Institute is a premier independent, nonprofit research and development organization with nine technical divisions using multidisciplinary services to provide solutions to some of the world's most challenging scientific and engineering problems. Headquartered in San Antonio, Texas, the Institute occupies 1,500 acres and provides more than 2.3 million square feet of laboratories, test facilities, workshops and offices for more than 2,600 employees who perform contract work for industry and government clients.



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ISO 9001:2015

Quality Certification — Chemistry and Chemical Engineering Division

The Chemistry and Chemical Engineering Division of Southwest Research Institute has achieved certification to ISO 9001:2015, an internationally recognized quality standard.

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