

# THE LUCIDEON ADVANTAGE

Insight Creating Advantage



# "Keeping your business one step ahead"

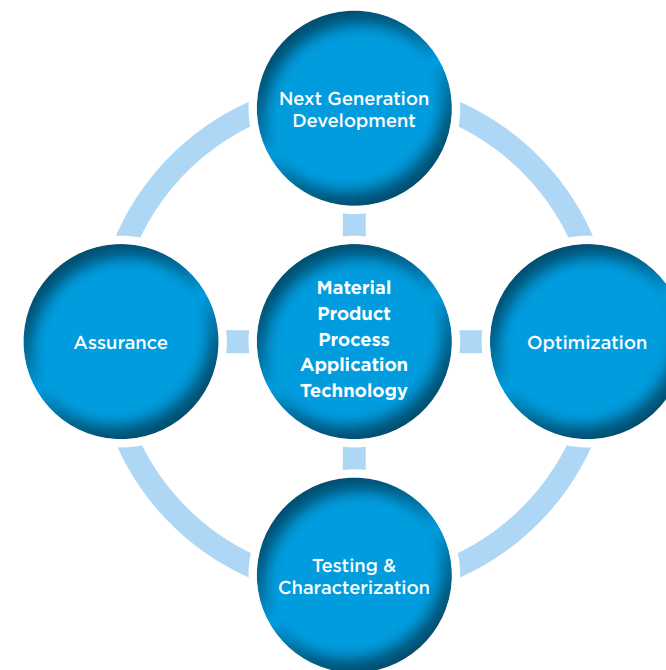
Lucideon is a unique business that creates and delivers game-changing materials technologies and processes to allow you, our clients, to make step-change gains in your competitive position in your markets, where new advances in material functionality, performance and costs are key competitive issues. The business model ranges from contract R&D, through customized technology developments, to the creation of technologies for sale or license.

We differentiate ourselves from in-house and university choices through our proven ability to cross-fertilize technologies from different sectors and applications, with speed and in confidence, to ensure clients get first-mover advantage. Like your goals, ours are commercial - we know time means money. We work in partnership, not only developing and challenging the science and engineering, but creating financial and market analysis to help investment decisions too.

We deliver these advantages from a combination of pilot and feasibility plant and equipment, developed and run by our multi-disciplinary team of scientists, engineers and commercial analysts. We support your developments through our world-leading testing and characterization labs, as well as our management certification and assurance division.

We operate on a "centers of excellence" basis, often sector-focused, where specialist equipment and instrumentation is backed by talented and experienced scientists and engineers to ensure we maximize quality.

We are the partner to "C" suite ambition.



Tony Kinsella, Chief Executive.



# "Through next generation development we've helped companies to gain first mover advantage"

Gemma Budd, Business Manager, Healthcare.

We work with you to develop the next generation of materials, products, processes, applications and technologies.

We do this in two ways:

Novel Materials Technologies

Development Support

## New Technologies, New Advantage

At Lucideon we're leading the way in the development of novel materials technologies to help you stay ahead of the game, be first to market and gain a competitive advantage.

We take a collaborative approach; we partner with you to adapt our novel technology platforms to your products and applications.

Our technologies are borne out of our materials expertise, our in-depth knowledge of industry challenges and our ability to cross-fertilize technologies across sectors.

To see our current pipeline and the licensing status of our technologies, please visit [www.lucideon.com/pipeline](http://www.lucideon.com/pipeline).



## iCRT - inorganic Controlled Release Technology

### Effective delivery of drugs using inorganic matrices

- Controlled release of challenging APIs for immediate or sustained release
- Particulate nature allows blending of two formulations for combination products
- Flexible physical form, e.g. powder, soluble film, suspension, granulate, tablet
- GRAS and IID approved materials
- A green manufacturing process
- Tailored solubility and porosity of the carrier controls drug release

## iCRT-deter

### Abuse deterrent technology using inorganic matrices

- Retarded release in alcohol and other household solvents - deters extraction
- Extremely high melting point - deters melting for injection
- Hard physical structure - difficult to crush
- Particulate nature - retains controlled release features if tablet is crushed
- Large particle size - difficult to inject

## Bioactive Glasses/Ceramics

### Inorganic technologies for healthcare applications

- mxHA (multi-substituted hydroxyapatite) - bone/tooth replacement, repair and drug delivery applications with enhanced biocompatibility and bioactivity
- iCRT - controlled release technology for delivery of key actives including drugs and inorganic ions, e.g. Ca, Ag
- Glass technologies - manipulation of glasses via novel manufacturing processes and compositions to deliver the chemical and physical properties needed, e.g. solubility, porosity, strength

## MIDAR

### Waste encapsulation technology

- A low temperature chemical reaction to consolidate materials and form a robust solid inorganic material with high strength and chemical stability
- Can be used as an encapsulation and immobilization agent by incorporating a solid or liquid waste stream into the inorganic solid matrix that is formed during the reaction
- The MIDAR process can be varied to accommodate different methods of forming: extrusion, molding and casting
- As no firing is required, energy usage and carbon emissions are reduced
- The resulting material is fire, frost, chemical, shock, water and heat resistant
- It has a low level of leachability of encapsulated materials, e.g. radioactive substances

## Bioresorbable Composites

### Development and optimization of composite processing technologies

- Tailoring of mechanical properties and biodegradation rate
- Expertise in the development of bioresorbable composites
- An example project is ReBioStent - the development of biodegradable stents with superior mechanical properties through the use of novel polymer and glass chemistries and processes

## FES - Field Enhanced Sintering

### Low-energy ceramic processing technology

- Based on the application of an electric field to the ceramic body during sintering
- Reduced sintering time and temperatures enabling significant increases in throughput, alongside large energy savings
- Manipulation of the parameters allows control and tailoring of the microstructure resulting in tougher ceramic products and performance benefits

# "Our experts have helped to develop and optimize a broad range of products and processes"

Frank Anderson, President, Lucideon M+P.



## Development Support

You may be developing your own technologies or working on the next generation of products. Or your focus may be on optimizing your existing products and processes to ensure that they perform to the best of their ability.

We can help - whether it's working on new products or applications, trying to improve yields or implementing a new processing line.

Our experts have carried out many diverse projects across a wide range of industries; they bring this knowledge to your challenge, cross-fertilizing technologies and solutions to ensure that your products and processes are performing optimally.

Analyzing failures, identifying their root cause quickly and making sure that they don't happen again is central to what we do.

*"Failure analysis is critical during every phase of the material life cycle. Analysis during the design phase can provide valuable information on how to improve the durability and performance of new products."*

**Julius Bonini,**  
Senior Metallurgical Engineer.



## We help you to:

- Understand materials and how they interact with each other
- Improve existing products
- Design your next generation of products
- Optimize processing routes and implement new ones
- Find the root cause of failures and stop them reoccurring
- Move products from feasibility through to laboratory trials and onto pilot and manufacturing scale and implementation.

## A Collaborative Approach

- Identification of objectives
- Brainstorming
- Research
- Feasibility studies
- Laboratory trials
- Pilot scale trials
- Manufacturing trials
- Process implementation

## Pilot Scale Capabilities

Our dedicated team has expertise in production process requirements and translating these into clearly defined scale-up projects. Together with our prototyping and pilot plant facilities this ensures a managed transition from lab-based technologies to pilot and then production-scale processes.

We have a wide range of pilot processes, from composition and forming to firing and machining, and also have dedicated glass laboratories with pilot scale facilities. We are also able to offer pilot scale facilities for powder processing and prototyping.





"Like our clients,  
we know that testing  
and characterization is  
vital to the success  
of any project"

Richard White, Head of Testing.

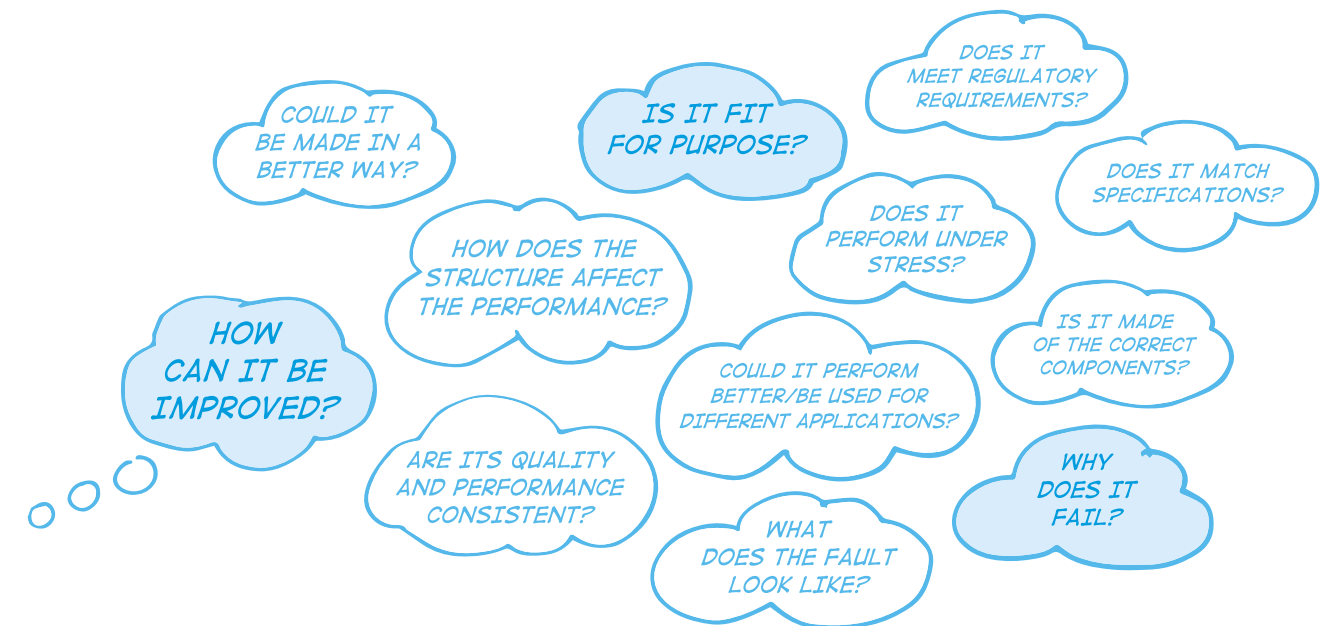


## Testing and Characterization Capabilities

Only by understanding your materials and products at the micro- and the macro-scale can you be sure of consistent current and future performance.

We help you to:

- Develop the products and technologies of the future
- Optimize the quality and performance of existing products
- Comply with legislation
- Pinpoint the root causes of failures and prevent them reoccurring
- Prove products are fit for purpose



From our ISO 17025-certified laboratories in the USA and the UK and Lucideon-approved laboratories around the world, our scientists test to national and international standards, while also providing customized testing programs.

And we constantly invest in our facilities to ensure we offer you the latest technology and techniques.

For certain sectors and capabilities we have "centers of excellence" where specialized equipment and instrumentation is backed by specialized knowledge.

**Our focus is on accuracy and quality and a consultative approach so that we don't just provide data, we provide solutions and knowledge, enabling us to help you develop the next generation of products and optimize existing ones.**

# "You can rely on us to give you the assurance you need"

Shaun Bainbridge, Director, Lucideon CICS.



## Assurance

**As a manufacturer, the final step in your process, before your product goes to market, is to ensure that it is fit for purpose. Our thorough testing programs provide the data you need to give both you and your customers peace of mind.**

Manufacturing is not only about output though, it encompasses the management systems your business puts in place, the quality, environmental and health and safety standards that ensure your product and your working environment are the best they can be.

And with energy usage perhaps the biggest cost that you have, implementing a robust energy management system can help you to reduce costs and cut emissions.

Reducing your environmental impact should form part of the strategy of every business. Measuring your carbon footprint and reporting your sustainability data, whether voluntarily or because of mandatory regulations, is now commonplace.

Every business in the world has to look to sustainability - how it can do more with less - and all of these systems combine to ensure you are meeting this important goal.

Ensuring that your data is accurate through independent verification is key to enhancing credibility of your claims among your clients.

And certifying your management systems to recognized ISO standards ensures that your business has a focus on continual improvement, leading to operating efficiencies, enhanced brand reputation and a motivated workforce.

At Lucideon CICS Limited we provide independent sustainability verification and management systems certification services.

Our greenhouse gas (carbon) verifiers are renowned for their expertise and for well-planned and executed verifications to comply with standards across a wide range of industries.

And, using our team of knowledgeable and experienced auditors, we have a history of providing impartial management system and product-specific certifications.

**We are accredited to provide verification and certification services by many of the world's leading accreditation bodies.**

- EU Emissions Trading Scheme
- Carbon Disclosure Project
- Carbon Footprinting
- ISO 9001
- ISO 14001
- ISO 50001
- OHSAS 18001
- Product Conformity
- BES 6001 Responsible Sourcing
- V-MARQ - Certification of Manufacturing Origin

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Research Triangle Park, NC, US



Stoke-on-Trent, UK



Schenectady, NY, US



## UK

### Stoke-on-Trent, Staffs

- Testing and characterization; ceramics and sintering development (FES); construction testing; healthcare and pharmaceutical testing; advanced surface analysis; independent verification and certification services

### Cambridge, Cambridgeshire

- Healthcare materials technologies R&D

## USA

### Schenectady, NY

- Testing and characterization; metallurgy; failure analysis; power generation materials; additive layer manufacturing support; wear testing

### Research Triangle Park, NC

- Materials technologies; Field Enhanced Sintering; biomaterials development; inorganic Controlled Release Technologies; nuclear waste encapsulation (MIDAR); independent verification and certification services

### Greenville, SC

- Power generation metallurgy; aerospace coatings; failure analysis; composite materials

## REST OF THE WORLD

### Hong Kong

- Ceramics testing; wear testing; pharmaceutical testing

### Mainland China

- Ceramics testing

### Thailand

- Ceramics testing

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