



Alexium: Engineering the Future of Sustainable High-Performance Materials Through Advanced Microencapsulation, Agile R&D, and Patent-Driven Global Innovation

Billy Blackburn, CEO



T rue innovation is not loud, it is purposeful. It solves real problems, improves everyday lives, and quietly sets new standards for performance and safety. The most enduring companies are those that blend scientific depth with commercial insight, transforming complex technology into practical solutions industries can trust. When research, responsibility, and resilience come together, materials become smarter, safer, and more efficient, reshaping how products perform in the real world.

Alexium stands as a powerful example of this approach. Founded in 2009 in Perth, Australia, by British and Australian entrepreneurs, the company began with the acquisition of Reactive Surface Treatment technology originally developed by the U.S. Air Force Research Laboratory for chemical and biological protection. From these strong scientific roots, Alexium has grown into a global performance chemicals provider, with its Operations and R&D headquarters in Greer, South Carolina.

Specializing in advanced materials with a focus on flame retardancy and thermal management, Alexium develops patent-protected technologies that address clear market gaps. Its solutions, trusted across bedding, body armor, military uniforms, workwear, transportation, and apparel are designed to enhance safety, comfort, and durability. Through brands such as AlexiCool®, AlexiFlam®, Eclipsys®, BioCool®, DelCool™, and AlexiShield®, the company delivers customizable products that improve both textile and non-textile applications.

Guided by a strong commitment to environmental responsibility and corporate governance, Alexium ensures its processes meet strict non-toxic and sustainability standards, often exceeding industry benchmarks. With a culture rooted in scientific excellence, integrity, and partnership, Alexium continues to redefine performance materials for a safer, smarter future.

CIO Bulletin had the distinct privilege of interviewing Billy Blackburn, the visionary CEO of Alexium. He shared compelling insights into how his company combines scientific rigor with strategic commercial foresight, positioning it as a trusted leader in advancing safer, smarter, and high-performance materials worldwide.

Interview Highlights

Billy Blackburn | CEO

Since taking the helm in 2022, Billy Blackburn has been the driving force behind Alexium's commercial acceleration. With a deep background in business development and material sciences, Blackburn has spearheaded the company's transition from an R&D-focused entity to scaling up with a portfolio of strong commercialized products. His leadership was instrumental in the strategic acquisition of Microtek Laboratories in late 2025, solidifying Alexium's position as a vertically integrated leader in microencapsulation. He champions a philosophy of "customer-centric innovation," ensuring that every molecule Alexium designs solves a tangible problem for both the client and the planet.

Alexium has evolved significantly since its early foundation in advanced material science. How are those core capabilities now guiding the company's strategic direction and growth ambitions for the future?

Alexium's journey began with a clear mission: to take advanced material science out of the laboratory and into the real world where it could save lives and improve daily living. In 2009, we acquired the rights to a groundbreaking Reactive Surface Treatment (RST) technology originally developed by the US Air Force for defense applications. This foundation in high-stakes, performance-critical protection established the DNA of our company.

Over the last decade and a half, we have pivoted from purely defense-centric applications to becoming a global leader in thermal management and flame resistance. By refining these military-grade technologies, we bridged the gap between niche chemical engineering and mass-market applicability. Today, we don't just treat surfaces; we engineer comfort and safety at a molecular level for everything from high-performance bedding to tactical gear, driven by a commitment to greener, smarter chemistry.

Can you highlight Alexium's core products like AlexiCool®, BioCool®, Eclipsys®, AlexiFlam®, and AlexiShield® along with custom R&D services, and what sets them apart through sustainability and rapid innovation?

Our portfolio is defined by a dual focus: industry-leading phase change materials (PCM) and next-generation FR safety.

Our PCM portfolio, enhanced by Alexium's acquisition of Microtek Laboratories, now includes both microencapsulated PCMs (mPCMs) available to formulators as Nextek and Vivtek products in dry powder, wet cake, and slurry forms. Alexium has also expanded its fully formulated coating offerings with specially designed formulations for textiles, bedding, and furniture applications, branded as AlexiCool® and BioCool®, available for diverse manufacturing applications:

- **Nextek** and **Vivtek** are microencapsulated PCM products available to formulators for application on textile and foam coatings and for infusion into foams and other substrates.
 - o Nextek offers an economical option optimized for a cool-to-the-touch effect.
 - o Vivtek is a more premium

option featuring a bio-based core and offering long-lasting cooling.

- **AlexiCool®** is our flagship formulated PCM technology. It features a triple cooling attribute with embedded active heat absorption, moisture management, and conductive cooling. It is the best-value PCM in the portfolio and is microplastic-free.
- **BioCool®** takes that cooling power and grounds it in sustainability. It is a USDA BioPreferred® certified PCM derived from plant-based materials, proving that high performance doesn't require synthetic trade-offs. BioCool also offers industry-leading enthalpy of over 200 J/g ([see release](#)), meaning it absorbs and manages significantly more heat per unit than standard competitors, providing cooling capacity that lasts. It also features an enhanced self-recharging property by recrystallizing faster than other PCMs.
- **Eclipsys®** offers "perpetual cooling." Unlike PCMs, which require time to recrystallize and "reset," the patented multi-layered Eclipsys system continuously funnels heat away from the body, making it an ideal solution for bedding and other industry applications like body armor, headwear,

footwear, athletic pads, electronics, and furniture.

- The FR portfolio is also impressive, with applications ranging from the furniture and bedding industry to apparel.
- Crucially, we are now highlighting **AlexiShield**, our newest FR advancement. AlexiShield is a completely organophosphorus-free treatment available as a chemical finish or in finished socks. It represents the future of compliance-ready materials, eliminating traditional substances of concern without sacrificing fire safety.
- **AlexiFlam®** is a game-changing FR solution for apparel made from cotton and cellulose because it is free of harsh finishing processes and is wash-durable for up to 50+ industrial launderings. It also allows less expensive, more breathable fabrics to utilize the coatings to achieve the same level of protection as inherent flame-resistant fibers, while delivering improved comfort.

Your proprietary phase-change materials and specialty textile solutions are often described as “drop-in innovations.” What makes Alexium’s technology stand out in a highly competitive materials science landscape?

The term “drop-in” is vital to our value proposition. In materials science, the best chemistry is useless if it requires a manufacturer to rebuild their entire factory to use it. We design our solutions to work seamlessly with existing, industry-specific manufacturing equipment and processes.

What truly differentiates us, however, is the performance of our products. We provide the highest-enthalpy PCMs on the market and FR solutions that are not just flame retardant, but also capable of providing exceptional comfort without sacrificing critical protection.

Innovation at Alexium seems deeply rooted in R&D collaboration. How does your team translate complex scientific breakthroughs into commercially scalable solutions for partners?

We view ourselves as an extension of our partners’ R&D teams. We don’t just hand over a drum of chemicals; we engage in “*agile engineering*.” For example, with our recent acquisition of Microtek Laboratories, we have vertically integrated our capabilities to include advanced microencapsulation.

This allows us to rapidly prototype and test new formulations in our Greer, SC facility, which mirrors real-world production environments. By deconstructing the complex relationships between particle size, shell structure and thermal profiles in-house we de-risk the innovation process for our clients in a way our competitors can’t—ensuring a breakthrough in our lab translates to a flawless production run in their plant.

As a 2026 Innovation Excellence Awards nominee, how does Alexium’s R&D with 25 patents and agile testing lead in tackling textile challenges?

Our 25+ patents are not just intellectual property; they are solutions to specific industry pain points. The textile industry is currently facing a “*compliance cliff*,” where regulators are banning legacy

“With the acquisition of Microtek Laboratories, we strengthened our vertically integrated microencapsulation capabilities, allowing us to rapidly prototype, de-risk innovation, and ensure every breakthrough in our lab delivers flawlessly in our partners’ production lines.”

chemicals (like PFAS and certain flame retardants) faster than the market can adapt.

Our agile R&D approach allows us to stay ahead of these bans while simultaneously pushing the next frontier in performance. For instance, while others are scrambling to replace organophosphorus chemistries, we have already launched AlexiShield, which meets both the performance and regulatory demands of a changing market. Our patent portfolio protects these unique, non-toxic synthesis methods, giving our clients a safe harbor in a regulatory storm. We test aggressively against international standards (ASTM, ISO) so that when a client adopts our technology, they know it is compliant today and future-proofed for tomorrow.

How has Alexium's focus on environmental responsibility and exceeding industry standards for non-toxic processes influenced your collaborations

across bedding, military, transportation, and apparel sectors?

Environmental responsibility is no longer a "nice-to-have"; it is a license to operate. In the bedding sector, consumers are intimately close to the product for eight hours a day, so toxicity is a major concern. Our push for formaldehyde-free and organophosphorus-free solutions has made us the partner of choice for premium brands that cannot afford reputational risk.

In the military sector, the focus is shifting toward "safe sustainment." Our non-toxic processes ensure that the soldiers protecting us are not exposed to harmful chemicals in their own uniforms. This "compliance-ready" stance helps us exceed standards like OEKO-TEX® and REACH, fostering trust across all sectors—from parents buying mattresses to defense contractors sourcing uniforms.

Are there any upcoming technologies, services, or

product launches in the pipeline that customers and partners should be particularly excited about?

We are incredibly excited to tease a major breakthrough in our Phase Change Material (PCM) lineup. We are in the final stages of validating a next-generation PCM that is completely free of formaldehyde and microplastics.

Current market PCMs often rely on microencapsulation techniques that can contribute to microplastic pollution or contain trace aldehydes. Our new development solves this. It delivers the industry-leading cooling power Alexium is known for, but with a pristine environmental profile that eliminates substances of concern. This will be the first "truly clean" cooling technology of its kind, and it is poised to reset the standard for sustainable thermal comfort.

Finally, what's next for Alexium as you continue to push the boundaries of material science on a global stage?

The future of Alexium is about holistic thermal and safety management. Following our integration of Microtek, we are expanding beyond just textiles into broader industrial applications, leveraging microencapsulation as a foundational core capability. We are moving toward a world where our materials don't just react to the environment but actively manage it, all while adhering to the strictest principles of green chemistry. We are building a future where high performance and environmental stewardship are one and the same. 

Company Spotlight

Company Name: Alexium

Founding Year: 2009

Website: www.alexiuminternational.com

Email: info@alexiuminternational.com

CEO: Billy Blackburn

Target Audiences: Bedding Manufacturers, Military & Defense (Uniforms/Gear), Performance Apparel, Workwear, Residential & Commercial Furnishings.

Top Clients or Industries Served: Mattress & Bedding, Military/Defense, Activewear, and Transportation.

Office Locations: Greer, South Carolina, USA (Operations & R&D HQ); Melbourne, Australia (Corporate HQ); Perth, Australia.