



Editorial for the ESB 2025 collection

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The European Society for Biomaterials (ESB) has long stood as a pillar in the global biomaterials' community, promoting excellence in research, collaboration across the science of biomaterials and their translation towards clinical use, as well as nurturing the next generation of scientists and innovators. In recent years, this partnership-driven approach has extended with renewed strength to its longstanding relationship with the *Biomaterials Science* journal. As we look ahead to the 50th Anniversary of our society and ESB 2026, and to the exciting research directions it will showcase, we are delighted to introduce the **ESB 2025 collection**. This initiative celebrates the work of the ESB community by bringing together contributions from conference participants and ESB members into a unified, openly accessible collection. The ESB 2025 collection is designed not only as an academic resource but also as a reflection of the rich, dynamic character of the ESB community. It includes a selection of contributions submitted by attendees of

the ESB 2025 conference held in Turin, Italy (7–11 September 2025), alongside manuscripts submitted by ESB members who, upon acceptance, have chosen to include their published work in this themed collection. This combined format creates a unique snapshot of the diverse scientific advances currently shaping the biomaterials landscape. Importantly, all contributions in the collection will be made freely accessible until the ESB 2026 conference, ensuring that the knowledge generated by our community reaches the widest possible audience and continues to inspire new research and collaborations.

In this Editorial, we take the opportunity to highlight the intentions, themes, and significance of the ESB 2025 collection. By bringing together conference-driven contributions and member-submitted research within a single platform, we hope not only to strengthen the bond between the *Biomaterials Science* journal and the ESB but also to amplify the scientific influence of the international biomaterials community, whose work continues to define the frontiers and new horizons of biomaterials research. The ESB 2025 collection is expected to further deepen this interdisciplinary dialogue, highlighting advances that push conventional boundaries and showcasing ideas that redefine our understanding of biomaterials and what they can achieve.

Biomaterials research has always been inherently multidisciplinary, but in the past decade, we have witnessed an unprecedented expansion of the field's

scope. No longer limited to the development of biomedical implants or surface coatings, today's biomaterials are deeply intertwined with topics such as regenerative medicine, immunomodulation, 3D bioprinting, biofabrication, artificial intelligence-driven design, and sustainable materials development. The convergence of these areas underscores the need for a platform that captures not only cutting-edge findings but also the context and collaborative energy behind them. The ESB annual conferences have consistently provided such a platform. They bring together scientists, clinicians, engineers, biologists, entrepreneurs, and policymakers who share a fundamental interest in improving human health through the strategic design and application of biomaterials.

In addition, one of the most significant aspects of the ESB 2025 collection is its inclusivity. Instead of limiting participation to ESB 2025 conference attendees alone, the collection also welcomes contributions from ESB members more broadly. This dual-pathway model highlights the depth and breadth of the ESB's scientific base. Research presented at the ESB 2025 conference can be considered as a preview of the biomaterial field's direction in the coming years. Indeed, attendees considered the ESB conference as an opportunity to share early insights, conceptual breakthroughs, or the first results of ambitious biomaterials-related projects that aim to address pressing challenges in healthcare and beyond. The inclusion of these contributions in the ESB 2025 collection

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ensures that these ideas are not only disseminated widely among the conference attendees but also contextualized within a focused thematic framework. The strength of the ESB lies in its diverse and engaged membership. Scientists at all stages of their career (*i.e.*, PhD students, postdoctoral researchers, established academics, industry professionals, and clinicians) contribute to a vibrant environment that encourages innovation and collaboration. This community-driven approach has always been central to ESB conferences, and it is equally integral to the ESB 2025 collection. Through the dual inclusion model, the collection becomes a living tribute to the achievements, aspirations, and collaborative spirit of ESB. It captures not only the scientific contributions presented during the ESB 2025 conference but also the broader intellectual landscape that ESB members help to shape throughout the year.

Beyond the ESB 2025 conference, the ESB community includes a diverse network of researchers whose work spans continents and life science disciplines. Many of these members publish regularly in *Biomaterials Science*, contributing to the journal's status as a leading venue for high-impact research. Through this ESB 2025 collection, ESB members whose manuscripts are accepted in the journal, in the months after the ESB 2025 conference, are invited to enrich the collection by opting to include their publications. This integration strengthens the unique identity of the ESB community as one driven by openness, continuity, and scientific rigor. It allows the collection to reflect not only the ESB annual conference event but also the sustained achievements of researchers whose dedication to the biomaterial field shapes its long-term future.

The collaboration between the ESB and *Biomaterials Science* is grounded in a shared mission: to support the dissemination of high-quality research, foster community, and promote scientific advancement. Over the years, this partnership has contributed significantly to the visibility and cohesion of the

European Biomaterials' community. The ESB 2025 collection represents a new chapter in this ongoing relationship. Moreover, the ESB 2025 conference and the related themed collection provide significant visibility for emerging scientists by offering an inclusive platform where early-career researchers can share their innovations alongside established experts.

While the full breadth of topics in the ESB 2025 collection will only be known once the collection is complete, several themes are expected to feature prominently based on current trends in biomaterials research and themes discussed during the ESB 2025 conference. As an example, but not an exhaustive list, here are some of the topics:

Advanced biomaterials for tissue regeneration. Regenerative medicine remains one of the pillars of biomaterials science. Innovations in scaffold design, cell–material interactions, and bioactive material development continue to drive progress in the repair and replacement of damaged tissues. We expect the collection to highlight advances in materials for bone, cartilage, cardiovascular, neural, and soft tissue regeneration, as well as emerging strategies that leverage endogenous healing mechanisms.

Immunomodulatory and immune-informed biomaterials. The pivotal role of the immune system in determining biomaterial performance has led to the rise of immune-informed material design. Research in this area explores how materials can modulate immune responses to promote healing, minimize inflammation, or enhance therapeutic outcomes. Indeed, innovations in immunomodulatory biomaterials, vaccine delivery platforms, and inflammatory disease management could be part of the ESB 2025 collection.

Biofabrication and 3D bioprinting. Biofabrication continues to transform the way researchers design functional tissues and complex architectures. Advances in bioprinting technologies, printable bioinks, and hybrid fabrication strategies are opening new avenues for translational and clinical applications. Contributions exploring these topics are

expected to be well represented in the collection.

Smart and responsive biomaterials. The next generation of biomaterials is characterized by responsiveness: to biochemical cues, mechanical stimuli, environmental changes, and user-controlled triggers. Such smart, adaptive materials have major implications for drug delivery, diagnostics, regenerative therapies, and personalized medicine.

Sustainable and green biomaterials. With growing global interest in sustainable science, biomaterials research is increasingly turning toward renewable feedstocks, eco-friendly production methods, and circular design principles. The ESB 2025 collection is expected to feature innovative approaches to biodegradable materials, biopolymers, and greener synthesis routes.

As we introduce the ESB 2025 collection, we do so with a great sense of anticipation for the extraordinary research that will be shared through this initiative. The collection showcases not only scientific excellence but also the collaborative, inclusive, and forward-looking identity of the ESB community. As the field of biomaterials expands into new territory, including digital biomaterials, systems-level design, and interfaces with synthetic biology, future ESB-driven initiatives will play a crucial role in defining research priorities and highlighting the innovations that emerge from the European research community.

We extend our sincere thanks to all contributors, *i.e.*, conference attendees, ESB members, and reviewers, whose efforts make this collection possible. We look forward to seeing how the ESB 2025 collection will inspire new ideas, connections, and discoveries as the field of biomaterials continues to evolve.

Together, we celebrate a shared commitment to advancing biomaterials science and strengthening the bond between the ESB and *Biomaterials Science* journal. We hope that this collection serves not only as a record of the ESB 2025 conference but also as a catalyst for scientific breakthroughs of tomorrow and their transition towards clinical application.