MATTER IN TRANSIT:

TOWARD THE INDUSTRIAL ADOPTION OF BIO-BASED MATERIALS IN IBERO-AMERICA

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DISEÑO E INNOVACIÓN

THE TRANSITION TO A CIRCULAR ECONOMY PRESENTS NEW CHALLENGES FOR THE DEVELOPMENT AND INDUSTRIAL ADOPTION OF BIO-BASED MATERIALS. IN IBERO-AMERICA, THE DIVERSITY OF RESOURCES AND RESEARCH CAPABILITIES OFFERS SIGNIFICANT OPPORTUNITIES, BUT TECHNICAL, PRODUCTION-RELATED, REGULATORY, AND COLLABORATION BARRIERS PERSIST, HINDERING THEIR TRANSFER. THIS SPECIAL ISSUE SEEKS TO EXAMINE THE TRANSITION OF BIO-BASED MATERIALS FROM THE LABORATORY TO INDUSTRY AND TO HIGHLIGHT THE ROLE OF DESIGN, COLLABORATIVE NETWORKS, AND TERRITORIAL CONTEXTS. WE INVITE EMPIRICAL, THEORETICAL, CRITICAL, OR METHODOLOGICAL CONTRIBUTIONS. TOPICS MAY INCLUDE THE CIRCULAR ECONOMY AND TERRITORY, BIOMASS UTILIZATION, MATERIAL CHARACTERIZATION AND PERFORMANCE, REGULATIONS AND CERTIFICATION, TECHNOLOGY TRANSFER, INDUSTRIAL VALIDATION, AND COLLABORATIVE NETWORKS, AS WELL AS OTHER APPROACHES THAT EXPAND KNOWLEDGE OF INNOVATION IN BIO-BASED MATERIALS.

The transition to more sustainable production and consumption models, promoted by the Sustainable Development Goals (SDGs 9 and 12), is driving the search for alternatives to conventional materials with a high environmental impact. In this context, the development of new materials from renewable resources and production byproducts opens up opportunities to reduce environmental impacts and leverage resources specific to different regions, taking into account their productive, environmental, and cultural characteristics.

To contribute to this transition, bio-based materials must advance from research and development toward their incorporation into production systems (Mohanty et al., 2018; Vural Gursel et al., 2022). However, barriers to their industrial adoption and integration into production chains have long been identified and remain unresolved. Therefore, understanding the factors that influence their development and transfer is key to advancing more sustainable production systems (Wechsler Pizarro & Castillo Espinoza, 2026).

Ibero-America has an abundance of agro-industrial, forestry, and urban byproducts with potential for valorization, and the diversity of its productive ecosystems offers considerable opportunities for developing bio-based materials rooted in local crops, industries, and knowledge, such as those derived from agave and sotol bagasse, fique fiber, yerba mate byproducts, and rice hulls. However, their utilization faces technical, cultural, market, and regulatory barriers (Kirchherr et al., 2018).

Among the technical barriers, recent assessments in the region identify a lack of standardized characterization methods: laboratories apply different standards and procedures, which leads to inconsistent results (BioRed Iberoamérica, 2024). Without comparable data, it is difficult to move toward the industrial validation of these materials. Their adoption also requires adaptation processes and collaboration among all the stakeholders involved.

Comparable data are also essential for advancing technological maturity, which requires validating the performance of materials in environments progressively closer to their real-world application (Mankins, 1995). In addition to demonstrating their technical performance, these materials must meet shared sustainability criteria (European Committee for Standardization [CEN], 2016), such as the internationally consistent national frameworks that the OECD has recommended since 2012 for assessing the sustainability of bio-based products throughout their life cycle (OECD, 2012/2025).

It is therefore not surprising that many proposals remain at the laboratory stage. Despite showing high scalability potential, they lack standardized technical data sheets and pilot infrastructure, which hinders their progress toward industrial production. Added to these limitations is the struggle to coordinate the work of academia with companies, producers, and government. The challenge, therefore, goes beyond the availability of raw materials: it also involves their integration into production systems

capable of transforming research results into industrial applications (Briones Castro et al., 2026).

These difficulties are part of a regional context marked by limited investment in research and development and weak collaboration between universities and companies. Between 2016 and 2025, R&D investment in Latin America grew by 1.4% annually, compared with the global average of 4.9% (World Intellectual Property Organization [WIPO], 2026). Furthermore, the link between universities and companies has focused on consulting and technical services rather than long-term collaborations geared toward innovation (Arza, 2010). These conditions hinder the sustained incorporation of bio-based materials into regional products and markets.

None of these dimensions progresses in isolation. Innovation in bio-based materials emerges from ecosystems in which universities, technology centers, companies, producers, governments, and communities co-produce knowledge. In these ecosystems, collaborative relationships are fundamental to advancing toward circular production systems (González Quintero & Candela Sanjuán, 2026), and design can strengthen these linkages (Wechsler Pizarro & Castillo Espinoza, 2026). Collaboration networks are therefore not merely a supporting element for material innovation: they are the settings in which materials are validated, transferred, and embedded in local contexts.

This linkage is especially relevant for advancing toward a circular economy aimed at maintaining the value of resources and reducing byproduct generation throughout the life cycle (Geissdoerfer et al., 2017). In the field of bio-based materials, these principles translate into specific challenges, such as reducing dependence on fossil resources, utilizing byproducts, contributing to the regeneration of natural systems, and extending the productive use of biomass in high-value applications (Vural Gursel et al., 2022).

One example is BioRed Iberoamérica, a CYTED thematic network (324RT0155) that brings together research groups, laboratories, and companies in the region to promote technology transfer for bio-based materials (BioRed Iberoamérica, 2024). Its initiatives include the International Symposium on Circular Economy and Bio-Based Materials: Toward Industrial Validation in Ibero-America (SIEM), held in Chihuahua, Mexico. This symposium opened a direct dialogue with the productive sector through working groups with companies and a parallel workshop with local producers (Universidad Autónoma de Chihuahua [UACH], 2026).

In this context, design plays a crucial role in connecting research, production, and the use of new materials. Its contribution includes defining technical, production, and usage requirements, exploring applications, and developing products and business models that promote the effective use of resources and circularity in production systems (Bocken et al., 2016).

The journal *Base Diseño e Innovación* has already dedicated issues to emerging materials and biodesign (Alarcón Castro & Arruda, 2022), as well as to nature-inspired innovation (Bravo, 2025), with an emphasis on material exploration. This new issue seeks to broaden that conversation to include the challenges of incorporating bio-based materials into production systems, considering the technical, economic, and collaborative conditions necessary for their adoption.

This special issue aims to bring together research that addresses the challenges of incorporating bio-based materials into production systems from the perspectives of design, materials science, and innovation management. We are particularly interested in understanding how collaborative networks, territorial capabilities, and technology validation and transfer processes can foster their industrial adoption.

We invite submissions of empirical, theoretical, critical, or methodological contributions that examine these issues from a range of perspectives. Studies on real-world applications, technology transfer, and collaboration with productive, institutional, and community stakeholders are especially welcome. For submissions on material development and scale-up, we value contributions that identify the technology readiness level (TRL) and the barriers to advancing their industrial application.

Submissions may address one of the following themes:

1. **Circular economy and territory**. Industrial, agricultural, and construction byproducts; industrial symbiosis; and regional bioeconomy.
2. **Biomass utilization and production chains**. Agro-industrial and forestry byproducts, their availability, logistics, and links with local producers.
3. **Environmental remediation, public health, and agromaterials**. Preventive bioeconomy, development of agromaterials, and soil phytostabilization to conserve resources and mitigate environmental impacts.
4. **Characterization, processing, and performance**. Biopolymers and composites, transformation processes, and performance in real-world applications.
5. **Criteria, regulations, and certification**. Technical data sheets, testing standards, life cycle assessment, indicators, and public policies.
6. **Technology transfer and industrial validation**. Technology scale-up, particularly between TRL 4 and TRL 7, success stories, spin-offs, intellectual property, and pilot infrastructure.
7. **Collaboration networks and capacity building**. Network governance, internships, training programs, living labs, and community participation; curricular innovation and teaching experiences oriented toward research, experimentation, and the transfer of bio-based materials.

TYPES OF CONTRIBUTIONS

Original research articles, literature reviews, and theoretical or methodological contributions related to the call for papers will be accepted. All manuscripts must present a well-founded contribution to knowledge and adhere to the journal's academic and editorial standards.

MANUSCRIPT SUBMISSION REQUIREMENTS

- **Originality**. Manuscripts must be original, unpublished, and not under review by another journal. Extended versions of papers presented at conferences will be accepted, provided this is stated in the abstract or introduction.
- **Content and structure**. Manuscripts should clearly present the research problem or topic, its objectives, the theoretical background and state of knowledge, as well as the approach and procedures used. The presentation of results, analysis, and conclusions should be consistent with the type of contribution and make its contribution to knowledge in the field clear.
- **Length**. The maximum length is 5,000 words.
- **Language**. Manuscripts in Spanish or English will be accepted. Texts in English must consistently use British or American spelling.
- **References**. References must follow APA style (7th edition) and include a DOI or URL where available.
- **Submission process**. Manuscripts must be submitted exclusively through the Base Diseño e Innovación OJS platform. To do so, authors must register and follow the instructions available in Author Information and Submissions. Authors must review all submission requirements before submitting a manuscript.

IMPORTANT DATES

CALL FOR PAPERS ANNOUNCEMENT
November 9, 2026

MANUSCRIPT SUBMISSION DEADLINE
January 31, 2027

EDITORIAL AND PEER REVIEW PERIOD
1 de febrero al 15 de marzo de 2027

DEADLINE REVISED MANUSCRIPTS
April 15, 2027

PUBLICATION
July 2027

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