Wood modification is a field that has enjoyed sustained interest over the past two decades, although its history can be tracked back significantly further, to the pioneering work of Alfred Stamm and co-workers at the Forest Products Laboratory in the USA in the 1930s, 1940s, and 1950s [1–4]. The steady surge in interest over the last twenty years reflects a period in which there has been a series of European conferences dedicated to this topic, starting in Ghent in 2003 [5], and migrating around Europe biennially ever since [6]. The conference series itself was initiated by the EU Thematic Network on wood modification, which started in 2000 with partners from 15 European countries [7]. In parallel, a European Thermally Modified Timber workshop was also developed, and has been run by the IHD in Dresden since 2003 [8]. This has been a driver for a great deal of innovation in Europe and, indeed, globally.

As a result, commercially available wood modification techniques such as thermal modification, acetylation, and furfurylation are well established and have been well studied [9–13]. A wealth of textbooks are available to consolidate this topic and communicate the state of the art in this field [14–16]. Many other modification systems for wood are still under development, using resins, bio-based chemicals, biopolymers, and novel combinations of heat, pressure, steam, or other active components [17,18]. Mechanical and physical modification systems have also evolved in parallel with thermal and chemical methods [19,20]. Most wood modification systems seek to enhance the dimensional stability of wood [21–23], while many also extend its service life [24] and provide durability and resistance to fungal decay [25–28] or insect and marine borer attacks [29].

In recent years, innovation in wood modification has focused on three main themes: combining modifications to increase the range of benefits offered [30–34]; seeking bio-based or green chemistry modifications [35–38]; and introducing nanotechnologies to provide innovative functional materials [17,37,39–42]. As a result, an invitation was extended to authors for papers relating to each of these aspects for a Special Issue, and the papers received met this demand well.

Five of the papers in this Special Issue address thermal modification or thermal processes [43–47]. Four of the papers address innovative chemical treatment agents [45,48–50], while another considers the effect of delignification on the densification process [51]. One paper considers the permeability gains made using microwave drying as an intended pre-treatment for impregnation-based modification systems [47].

Two papers consider wood functionalisation methods, namely, phase change materials [52] and the use of silver nanoparticles [50]. These suggest potential for use in advanced building products (thermal efficiency) and resistance to biodegradation, respectively. Clearly, there is plenty of overlap within this cohort of papers, and several papers use a combination of approaches [45,50,51], reflecting the current trends in research related to this subject.

Excitingly, two papers use machine learning, algorithm optimisation, or modelling approaches to improve prediction and processing [43,44]. This area is set to develop in parallel with advances in Industry 4.0 and as concepts become incorporated within wood modification technologies.
Looking at the published articles, we can say that the demand for sustainable, natural materials and technologies is steadily emerging even in wood modification procedures. These concepts have always been in at the heart of the basic principles of wood modification. All the scientific results published in this area ultimately contribute to the industrial application of as many promising modification processes as possible, hopefully within the shortest possible time.

We hope that you will enjoy this selection of recent research in the field of wood modification and property optimization. With so many advances being made by such a wide group of researchers around the globe, it remains essential to tune in to what is happening in different sub-topics within the wider field of wood modification.

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