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Editorial

Special Issue "Recent Developments on Functional Coatings for Industrial Applications, Volume II"

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Abstract: "Recent Developments on Functional Coatings for Industrial Applications, Volume II" addresses the provision of further insights into new and emerging research assets concerning the design, manufacturing, characterization and optimization of functional coatings for industrial applications. The aim of this Issue is to further contribute to the improvement of knowledge on functional coatings synthesis, characterization and tailoring, emphasizing its emerging industrial applicability in several industrial fields. The multidisciplinary nature of the theme represents a further stimulus aimed at enhancing the applicative importance and the technological versatility of the engineering design of functional surfaces. A multidisciplinary approach will act as a further stimulus in encouraging researchers to exploit suitably the applicative relevance and adaptability of functional coating and surface engineering design and tailoring.

Keywords: coatings; synthesis; characterization; energy saving; surface texturing

The research surrounding functional coating technology has gained increasing interest in recent years thanks to their promising applicability for improved engineered materials. The conventional approach is involves the use of a coating on a surface to provide environmental protection or for aesthetic properties. Recently, the emergent demand for engineered, multifunctional materials has enhanced the development of innovative, smart and high-performance coatings in various application fields. These materials must be designed to have applications in a wide array of industrial contexts or aimed at specific applications, supplying targeted capabilities such as durability in severe environmental conditions, chemo-thermal and mechanical stability, tailored surface morphology or environmental sustainability [1].

In such a context, *Coatings* aims to advance this cause with a first Special Issue in this research field. The aim of this Special Issue was to favor the growth and development of scientific activities in these research areas, promoting the proposal of technologically innovative functional coatings, suitable for industrial scale-up.

In particular, this Special Issue contains six research articles and two review articles. June et al. [2]. assessed the effect of urethane crosslinking by a novel blocked isocyanate crosslinker on the rheological and mechanical performance of clearcoats for automotive applications. The results evidenced that the pyrazole-based blocking agent plays a key role in successfully reducing the curing temperature and at the same time improving the mechanical strength of the automotive clearcoat. Furthermore, the automotive coatings sector was also explored by Aranke et al. [3], who proposed a wide and well-structured review on coatings for automotive grey cast-iron (GCI) brake discs. In particular, this paper reviews the traditional and emerging coating technologies and materials for brake disc applications, emphasizing the comparison between the pros and cons of the different industrial choices.

Another sector that receives attention in this Issue is that of functional anti-corrosion coatings. Calabrese et al. [4] proposed a brief overview of the corrosion protection performances of sol–gel zeolite composite coatings. Based on results available in the literature, a

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Citation: Calabrese, L.; Proverbio, E. Special Issue "Recent Developments on Functional Coatings for Industrial Applications, Volume II". *Coatings* **2023**, *13*, 593. https://doi.org/10.3390/coatings13030593

Received: 27 February 2023
Accepted: 9 March 2023
Published: 10 March 2023

property–structure relationship of this class of composites is proposed, summarizing, furthermore, the competing anti-corrosion active and passive protective mechanisms involved during coating degradation. Additionally, a brief summary and a future trend evaluation are also reported.

Based on the state of the art, a deep analysis of data of this class of coating was performed, proposing furthermore a topological representation of the property–structure relationship.

Rahmati et al. [5] discussed the corrosion performances of a plasma electrolytic oxidation (PEO) coating on an AZ31 magnesium alloy. It was highlighted that the protective action of the coatings, evaluated by using electrochemical impedance spectroscopy at a long immersion time in a 3.5 wt.% NaCl solution, was mainly due to a compact inner layer. The best results were found for coatings produced by soft-sparking.

Moreover, Fernandez et al. [6] examined the barrier capacity of natural protective coating in alumina-forming alloys. This research activity was aimed at evaluating the durability of these metal alloys in a particularly severe environment for their use as a thermal energy storage material for concentrated solar power (CSP) technology. The results evidenced the formation of an $MgAl_2O_4$ protective layer generated by the alumina-forming alloys. Analogously Frontera et al. [7] proposed a paper focused on composite materials for sustainable energy technologies. In particular, a new adsorbent coating for an adsorption heat pump unit based on hybrid, organic–inorganic electrospun microfibers was investigated, yielding promising results.

Besides, Calabrese et al. [8] investigated different approaches to produce superhydrophobic surfaces by using short-term treatment with (i) boiling water, (ii) HF/HCl and iii) HNO_3/HCl concentrated solution etching. The development of superhydrophobic surfaces is necessary for a wide range of applications, including self-cleaning, anti-corrosion, anti-fouling, and anti-icing. In this paper, the most promising results were achieved for HF surface-treated samples that possessed a water contact angle above 175°.

Finally, Pizzanelli et al. [9] investigated using a multi-technique approach film of PVB-ATO composites obtained by solution casting in order to evaluate the suitability of these materials for application as plastic layers in laminated glass for glazing.

The experience gained with the previous issue clearly demonstrated that functional coatings are identifiable as new emerging materials for industrial application. Consequently, Volume II of this issue, based on the up-and-coming results, is aimed at enhancing the multidisciplinary nature of scientific research in the field of functional coatings by emphasizing applicability in many emerging industrial fields: in barrier [10,11], biomedical [12,13] or textile industries [14], as well as in sustainable energy technologies [15,16].

This second Special Issue will be useful for researchers who are investigating this scientific topic in order to provide a relevant improvement of knowledge in apparently dissimilar research and applied contexts. This can act as a methodological support and idea accelerator for possible new research paths concerning the design and tailoring of functional surface engineering.

Conflicts of Interest: The authors declare no conflict of interest.

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