

EDITORIAL

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# Editorial for thematic series: XIV Meeting of the Brazilian Materials Research Society, Symposium K: functional hybrid surfaces and interfaces: from characterization to applications. Rio de Janeiro, Brazil, September 27th to October 1st, 2015

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This special issue contains selected articles related to the scientific contributions presented at the XIV Meeting of the Brazilian Materials Research Society (SBPMat 2015) within the Symposium K: Functional hybrid surfaces and interfaces—from characterization to applications, held in Rio de Janeiro, Brazil, during September 27th through October 1st, 2015. This symposium hosted by SBPMat was organized by Welchy Leite Cavalcanti from Fraunhofer IFAM, Andréia Luísa da Rosa from Federal University of Minas Gerais (UFMG), Suelen Barg from University of Manchester (UoM), and Mariana Banea from Federal Center of Technological Education Celso Suckow da Fonseca in Rio de Janeiro (CEFET/RJ). The symposium was supported by the Brazilian Society of Adhesion and Adhesives (ABAA).

The main focus was on design, control and characterization of hybrid polymer/solid state materials aiming at applications in optoelectronics, coatings and adhesives. In order to disseminate the interdisciplinary and international work presented within Symposium K of the XIV Brazilian MRS Meeting, five contributions were selected ranging from research and development to applications of modern adhesion science.

The modification of materials and surfaces to improve adhesion or incorporate desired properties for specific applications was remarkable among the outstanding contributions. Saliba et al. developed a prominent approach applying organic composite coatings as protective layers for surfaces of steel pipelines designed for potential deep-water petroleum exploration. Tailoring the interfacial properties in the layer system was shown to be relevant for adhesion and protection against corrosion which are essential under harsh environmental conditions. Corrales Ureña and coauthors reported on properties of biofilms on hydrophilic silica surfaces successfully obtained from a biopolymer mixture suspension. A wide range of surface analysis techniques were applied to characterize the biofilm nanolayers. The positive results lead to a series of promising applications

such as bio-functionalization of potentially various surfaces to modify their adhesive properties. An approach to modify the surface properties of particulate polymer materials in order to improve their performance in bonding applications was described by de Avila Bockorny et al. The authors applied pretreatment processes to a thermoplastic polyurethane elastomer (TPU) powder and investigated the behavior following a procedure applied in shoe manufacturing industry. Common washing with organic solvents and innovative atmospheric pressure plasma treatments showed to be effective in increasing the peel resistance of adhesive joints. The study by Stamboroski and coauthors presented distinguished contributions in the direction of modifying material surfaces to tailor their interaction with contacting molecular films. The investigation aimed at tuning the interface activity of a magnesium alloy using several strategies to apply barrier layers. Among the considered strategies were dry processes like (i) deposition of siliceous polymer coatings in low pressure plasma processes, (ii) laser surface treatments in controlled gas atmospheres; and wet processes like (iii) dipping in liquid formulations containing a polymeric inhibitor or adsorption from a mixture of the enzyme laccase and the polysaccharide maltodextrin, resulting in a few nanometer thin films which may be considered as interfacial layers. Finally, Carrilo Beber et al. reported significant results regarding material durability on the fatigue lifetime prediction of adhesively bonded joints. The influence of plasticity on the lifetime prediction of toughened epoxy adhesives used for structural applications was studied by applying a stress-life approach via experiments and finite element analysis.

The contributions reflected the relevance of surface modification and activation technologies to tailor adhesion properties when aiming at technical applications. Within the symposium, theoreticians and experimentalists discussed the present state of the art in the field and future trends. We are glad to have presented in this special issue efficient approaches and processes to enable enhancing material durability solutions for a large range field of industries. In addition to the published articles oral and poster contributions were presented within the SBPMat 2015 Symposium K performed by researchers from numerous universities, institutes and research centers of several countries and continents. Among the published articles and further contributions it is notable that the Symposium K hosted a series of outstanding research supported by the program Science without Borders (Ciência sem Fronteiras) coordinated by CAPES (Coordination of Improvement of Higher Education Personnel) and by CNPq (National Counsel of Technological and Scientific Development), and by DAAD (German Academic Exchange Service).

I would like to express my sincere appreciation and thankfulness to the authors for the quality of the work performed. Towards the reviewers I am strongly thankful for the professional and rapid evaluations of the articles. Specially, I would like to express my gratitude towards the editor in chief, Silvio Romero de Barros, who strongly supported all the steps requested to build up this special issue.

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