

IUPAC Provisional Recommendations

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Definition of Materials Chemistry

Materials chemistry is focused on the design, preparation and understanding of innovative materials with useful properties. It is an emerging area of research where definitions are not well established. This document defines the area of materials chemistry for the benefit of chemistry communities and the general public worldwide interested in this discipline. This *provisional* recommendation defines the term “materials chemistry” as “Scientific discipline that designs, synthesizes and characterizes materials, with particular interest upon processing and understanding of useful or potentially useful properties displayed by such designed materials.”

This Recommendation and its definition of materials chemistry is based on the IUPAC Technical Report of P. Day, L. V. Interrante and A. R. West [PAC. 81,1707 (2009); <https://doi.org/10.1351/PAC-REP-09-03-02>]. The definition proposed there is continuously and gradually accepted within the chemistry community, confirming the authors' intention that “... in publications where a definition of materials chemistry is required, the proposed definition be used”. However, some inconsistent understandings of materials chemistry persist among parts of the worldwide community, where some scientific journals have not been an exception, which may lead to contextual confusions. This Recommendation reflects findings in the 2009 Technical Report as well as the development since. The most prominent examples demonstrating the growing impact of materials chemistry upon interdisciplinary communities are the official scopes of two scientific journals, *Chemistry of Materials* (ACS Publications, ISSN:

0897-4756) and *Journal of Materials Chemistry A, B & C* (RSC Publications, ISSN 2050-7496). The scopes of both journals state that materials chemistry comprises “... focus on the preparation or understanding of materials with unusual or useful properties ...” and “... new understanding, applications, properties and synthesis of materials ...”. This focus is topical, required, and applied from points of view of research, development, and application. It is implicitly of direct effect on society, as evidenced by subjects and contents of the majority of papers appearing in these journals. The definition of materials chemistry, and relevant understanding of this growing sector of pure and applied chemistry, is promoted also by the IUPAC, cf. the link to Materials Chemistry Education on the webpage <<https://iupac.org/materialschemistryedu/>>. The rule is that a new definition is endorsed in an IUPAC Recommendation. Only a verified and increasingly accepted definition is recommended and further promoted to the broadest audience possible through the worldwide network of IUPAC. Understandings (and definitions) of core areas of chemistry need to be clearly formulated and agreed upon in communities of chemists as well as in general public. This concerns also the emerging area of materials chemistry. Inconsistent understandings or definitions in education and research make the communication difficult. Thus, an agreed-upon and unified definition of “materials chemistry” may prevent confusions and provide common language in this area.

Comments by 31 July 2024

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