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Test methods for the characterization of organic transistors and materials

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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue
New York, NY 10016-5997
United States of America
stds.info@ieee.org
www.ieee.org

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TEST METHODS FOR THE CHARACTERIZATION OF ORGANIC TRANSISTORS AND MATERIALS

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IEEE Standard for Test Methods for the Characterization of Organic Transistors and Materials

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Abstract: Recommended methods and standardized reporting practices for electrical characterization of printed and organic transistors are covered. Due to the nature of printed and organic electronics, significant measurement errors can be introduced if the electrical characterization design-of-experiment is not properly addressed. This standard describes the most common sources of measurement error, particularly for high-impedance electrical measurements commonly required for printed and organic transistors. This standard also gives recommended practices in order to minimize and/or characterize the effect of measurement artifacts and other sources of error encountered while measuring printed and organic transistors.

Keywords: electrical characterization, FET, flexible electronics, high impedance, nanocomposite, nanotechnology, OFET, organic electronics, organic transistor, printed electronics, printing, transistor

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IEEE Introduction

This introduction is not part of IEEE Std 1620-2008, IEEE Standard for Test Methods for the Characterization of Organic Transistors and Materials.

This standard covers recommended methods and standardized reporting practices for electrical characterization of organic transistors. Due to the nature of organic transistors, significant measurement errors can be introduced if not properly addressed. This standard describes the most common sources of measurement error and gives recommended practices in order to minimize and/or characterize the effect of each.

Standard reporting practices are included in order to minimize confusion in analyzing reported data. Disclosure of environmental conditions and sample size are included so that results can be appropriately assessed by the research community. These reporting practices also support repeatability of results so that new discoveries may be confirmed more efficiently.

The practices in this standard were compiled from research and industry organizations developing organic transistor devices, materials, and manufacturing techniques. These practices were based on standard operating procedures utilized in laboratories worldwide.

This standard was initiated in 2002 to facilitate the evolution of organic transistors from the laboratory into a sustainable industry. Standardized characterization methods and reporting practices create a means of effective comparison of information and a foundation for manufacturing readiness.

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1.1 Scope

This standard describes a method for characterizing organic electronic devices, including measurement techniques, methods of reporting data, and the testing conditions during characterization.

1.2 Purpose

The purpose of this standard is to provide a method for systematically characterizing organic transistors. These standards are intended to maximize reproducibility of published results by providing a framework for testing organic devices, whose unique properties cause measurement issues not typically encountered with inorganic devices. This standard stresses disclosure of the procedures used to measure data and extract parameters so that data quality may be easily assessed. This standard also sets guidelines for reporting data, so that information is clear and consistent throughout the research community and industry.