



# Standard Guide for Assessing the Attachment of Cells to Biomaterial Surfaces by Physical Methods<sup>1</sup>

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## 1. Scope

1.1 This guide describes protocols that can be used to measure the strength of the adhesive bond that develops between a cell and a surface as well as the force required to detach cells that have adhered to a substrate. Controlling the interactions of mammalian cells with surfaces is fundamental to the development of safe and effective medical products. This guide does not cover methods for characterizing surfaces. The information generated by these methods can be used to obtain quantitative measures of the susceptibility of surfaces to cell attachment as well as measures of the adhesion of cells to a surface. This guide also highlights the importance of cell culture history and influences of cell type.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

D4410 Terminology for Fluvial Sediment

F22 Test Method for Hydrophobic Surface Films by the Water-Break Test

F2312 Terminology Relating to Tissue Engineered Medical Products

F2603 Guide for Interpreting Images of Polymeric Tissue Scaffolds

### 2.2 ISO Standards:<sup>3</sup>

ISO 4287 Geometrical Product Specifications (GPS)—Surface Texture: Profile Method—Terms, Definitions and

### Surface Texture Parameters

ISO 13565-1 Geometrical Product Specifications (GPS)—Surface Texture: Profile Method; Surfaces Having Stratified Functional Properties—Part 1: Filtering and General Measurement Conditions

## 3. Terminology

### 3.1 Definitions:

3.1.1 *adhesion, n*—a physiochemical state by which a cell is coupled to a non-cell surface by interfacial forces, which may consist of covalent or ionic forces.

3.1.2 *biocompatibility, n*—a material may be considered biocompatible if the materials perform with an appropriate host response in a specific application. **F2312**

3.1.3 *biomarker, n*—biochemical feature or facet that can be used to measure the progress of disease or the effects of treatment.

3.1.4 *biomaterial, n*—any substance (other than a drug), synthetic or natural, that can be used as a system or part of a system that treats, augments, or replaces any tissue, organ, or function of the body. **F2312**

3.1.5 *detachment, n*—process whereby an adhered cell or group of cells is actively detached from a surface.

3.1.6 *hydrophilic, adj*—having a strong affinity for water, wettable. **F22**

3.1.7 *implant, n—in medicine*, an object, structure, or device intended to reside within the body for diagnostic, prosthetic, or other therapeutic purposes.

3.1.8 *laminar flow, n*—well-ordered, patterned flow of fluid layers assumed to slide over one another. (See Ref (1).)<sup>4</sup>

3.1.9 *lay, n*—direction of the predominant surface pattern. **ISO 13565-1**

3.1.10 *passage, n*—the transfer or transplantation of cells, with or without dilution, from one culture vessel to another. It is understood that any time cells are transferred from one vessel to another, a certain portion of the cells may be lost and,

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

<sup>4</sup> The boldface numbers in parentheses refer to the list of references at the end of this standard.