

## [physica status solidi \(b\)](#)

Volume 242, Issue 13, Pages 2671 - 2680

**Special Issue:** Advanced Optical Diagnostics of Surfaces, Nanostructures and Ultrathin Films .

**Published Online:** 19 Oct 2005

Copyright © 2005 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

**Abstract** | [References](#) | Full Text: [PDF](#) (659k) | [Related Articles](#) | [Citation Tracking](#)

---

### Original Paper

Spectroscopic ellipsometry and reflectance anisotropy spectroscopy of biomolecular layers on silicon surfaces

Dietrich R. T. Zahn<sup>1\*</sup>, Simona D. Silaghi<sup>1</sup>, Christoph Cobet<sup>2</sup>, Marion Friedrich<sup>2</sup>, Norbert Esser<sup>2</sup>

<sup>1</sup>Institut für Physik, TU Chemnitz, 09107 Chemnitz, Germany

<sup>2</sup>Institute of Spectrochemistry and Applied Spectroscopy of Berlin, 12489 Berlin, Germany

**email:** Dietrich R. T. Zahn ([zahn@physik.tu-chemnitz.de](mailto:zahn@physik.tu-chemnitz.de))

\*Correspondence to Dietrich R. T. Zahn, Phone: +49-371-531-3036, Fax: +49-371-531-3060

### Abstract

The optical properties of the DNA bases deposited on flat and vicinal, hydrogen passivated Si(111) substrates are studied using spectroscopic ellipsometry (SE) up to 9.5 eV photon energy employing synchrotron radiation and reflectance anisotropy spectroscopy (RAS). The results for the dielectric function reveal strong optical anisotropy for adenine and guanine while the other two molecules form layers with isotropic properties. The experimentally derived dielectric functions are compared to density functional theory calculations of the optical response. Particularly interesting is the RAS response of the DNA bases as a function of thickness when deposited on vicinal Si surfaces. Ordering in the layers is induced by the step and terrace structure of the vicinal Si substrates. Even though the molecular structure is not dramatically different the RAS response is very distinct and allows an unambiguous identification of the bases. (© 2005 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim)

---

Received: 22 June 2005; Revised: 1 September 2005; Accepted: 2 September 2005

Digital Object Identifier (DOI)

10.1002/pssb.200541096 [About DOI](#)

---