1. Record Nr. UNINA9910453542403321

Titolo	Epioptics-9 [[electronic resource]] : proceedings of the 39th course of the International School of Solid State Physics : Erice, Italy, 20-26 July 2006 / / editor, Antonio Cricenti
Pubbl/distr/stampa	Singapore ; ; Hackensack, N.J., : World Scientific, c2008
ISBN	1-281-93433-X 9786611934330 981-279-403-4
Descrizione fisica	viii, 180 p. : ill
Collana	The science and culture series. Physics ; ; 29
Altri autori (Persone)	CricentiAntonio
Disciplina	537.6/22
Soggetti	Semiconductors - Surfaces - Optical properties Surfaces (Physics) - Optical properties Spectrum analysis Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	"This special volume contains the proceedings of the 9th Epioptics Workshop, held in the Ettore Majorana Foundation and Centre for Scientific Culture, Erice, Sicily, from July 20 to 26, 2006. The Workshop was the 9th in the Epioptics series and the 39th of the International School of Solid State Physics."--P. v.
Nota di bibliografia	Includes bibliographical references.
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Sommario/riassunto

This special volume contains the proceedings of the 9th Epioptics Workshop, held at the Ettore Majorana Foundation and Centre for Scientific Culture, Erice, Sicily, from July 20 to 26, 2006. The workshop was the 9th in the Epioptics series and the 39th of the International School of Solid State Physics. The workshop was aimed at assessing the capabilities of state-of-the-art optical techniques in elucidating the fundamental electronic and structural properties of semiconductor and metal surfaces, interfaces, thin layers, and layer structures, and at assessing the usefulness of these techniques for optimization of high-quality multilayer samples through feedback control during materials growth and processing. Particular emphasis is dedicated to the theory of non-linear optics and to dynamical processes through the use of pump-probe techniques together with the search for new optical sources. Some new applications of scanning probe microscopy to material science and biological samples, dried and in vivo, with the use of different laser sources are also presented.