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Dielectric function of annealed sub-stoichiometric silicon oxide layers EMANUELE RIMINI, CORRADO SPINELLA, CORRADO BONGIORNO, GIUSEPPE NICOTRA, IMM-CNR UNIVERSITA' DI CATANIA — We present an analytical methodology, based on electron energy loss spectroscopy and energy filtered transmission electron microscopy, which allow us to quantify the clustered silicon concentration and the complex dielectric function of annealed sub-stoichiometric silicon oxide layers, deposited by plasma enhanced chemical vapor deposition (PECVD). To put in evidence the Si clusters, formed as a consequence of the high temperature anneal and embedded in a SiO₂ host, we used energy selected bright field imaging with an energy loss tuned to the value of the Si bulk plasmon. The dielectric function of the sample is determined by fitting the experimental spectrum using the theoretical description proposed by Barrera and Fuchs(1). The model solves the problem of calculating the energy loss rate for electrons passing through a system of spherical particles of equal radii, located at random in a host material. The dielectric function of the host was preliminarily determined by a Kramers-Kronig analysis of reference pure PECVD oxide spectrum. (1) R.G. Barrera and R. Fuchs, Phys. Rev. B52, 3256 (1995)

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