

Nanocomposites and nanomaterials

Application of carbon as a barrier layer in Sc/Si multilayer X-ray mirrors

Yu.P. Pershyn, A.Yu. Devizenko, V.V. Kondratenko, A.Yu. Sipatov, V.S. Chumak

*National Technical University "Kharkiv Polytechnic Institute", 2, Kyrpychov Str., 61002 Kharkiv, Ukraine.
E-mail: persh@kpi.kharkov.ua*

By methods of small-angle X-ray reflectometry ($\lambda=0.154$ nm) we study the effect of carbon barrier layers with varying thickness ($t<1.2$ nm) on the process of scandium and silicon interaction in Sc/Si multilayer X-ray mirrors (MXMs) deposited with direct current magnetron sputtering. For an instrument testifying the interaction we take multilayer period changes since the periodicity can be controlled with sub-angstrom accuracy. Carbon layer is revealed to interact with both scandium and silicon layers forming carbides. The dependences of MXM period values on carbon layer thickness are determined for both interfaces (Sc-on-Si and Si-on-Sc). The composition of barrier interlayers is estimated.