BEHAVIOR OF METALLIC DIAGNOSTIC MIRRORS WITH DIFFERENT STRUCTURES UNDER CONDITIONS SIMULATING THOSE IN THE ITER FUSION REACTOR

V.S. Voitsenya[1], *O.F. Bardamid*[2]

[1]Institute of Plasma Physics,
National Science Center Kharkiv Institute of Physics and Technology, Nat. Acad. of Sci. of Ukraine
(*1, Akademichna Str., Kharkiv 61108, Ukraine*),
[2]Taras Shevchenko National University of Kyiv
(*60, Volodymyrs'ka Str., Kyiv 01601, Ukraine; e-mail: ngn@univ.kiev.ua*)

S u m m a r y

In the paper by V.S. Voitsenya *et al.* (Plasma Phys. Rep. **20**, 217 (1994)), a methodology aimed at an optimal selection of materials for in-vessel mirrors used in optical and laser methods of plasma diagnostics in the experimental fusion reactor ITER was elaborated. The corresponding systematic simulation studies concerning the behavior of mirror specimens fabricated from different metals with different structures – polycrystalline (Be, Al, SS, Cu, Ti, Mo, W, Ta), single-crystalline (SS, Ni, Mo, W), and film (i.e. the film/substrate structure, namely, Be/Cu, Cu/Cu, Rh/Cu, Rh/V, Rh/SS, Mo/SS, Mo/Mo) – as well as mirrors fabricated from amorphous alloys of the ZrTiCuNiBe type, under long-term sputtering by deuterium (in some cases, argon) plasma ions were carried out. Amorphous mirror specimens were shown to be much more resistant to the development of roughness in comparison with mirrors with any other structure, which results from the complete absence of any ordered structure on the surface on a scale exceeding a few nanometers. The most important results were confirmed experimentally on such fusion installations as the TEXTOR (Jülich, Germany), ASDEX-U (Garching, Germany), and Tore Supra (Cadarache, France) tokamaks, the heliotron Large Helical Device (Toki, Japan), on the small tokamak TRIAM-1M (Kyoto, Japan), and on special stands at Lausanne University (Switzerland) and in the Institut für Plasmaphysik, Association EURATOM-FZJ, FZ-Jülich (Germany).