Development of Ni-based multilayers for future focusing soft gamma ray telescopes - DTU Orbit (08/11/2017)

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Ni-based multilayers are a possible solution to extend the upper energy range of hard X-ray focusing telescopes currently limited at ≈79:4 keV by the Pt-K absorption edge. In this study 10 bilayers multilayers with a constant bilayer thickness were coated with the DC magnetron sputtering facility at DTU Space, characterized at 8 keV using X-ray reectometry and fitted using the IMD software. Ni/C multilayers were found to have a mean interface roughness ≈ 1:5 times lower than Ni/B4C multilayers. Reactive sputtering with ≈ 76% of Ar and ≈ 24% of N2 reduced the mean interface roughness by a factor of ≈ 1:7. It also increased the coating rate of C by a factor of ≈ 3:1 and lead to a coating process going ≈ 1:6 times faster. Honeycomb collimation proved to limit the increase in mean interface roughness when the bilayer thickness increases at the price of a coating process going ≈ 1:9 times longer than with separator plates. Finally a Ni/C 150 bilayers depth-graded mutilayer was coated with reactive sputtering and honeycomb collimation and then characterized from 10 keV to 150 keV. It showed 10% reectance up to 85 keV

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