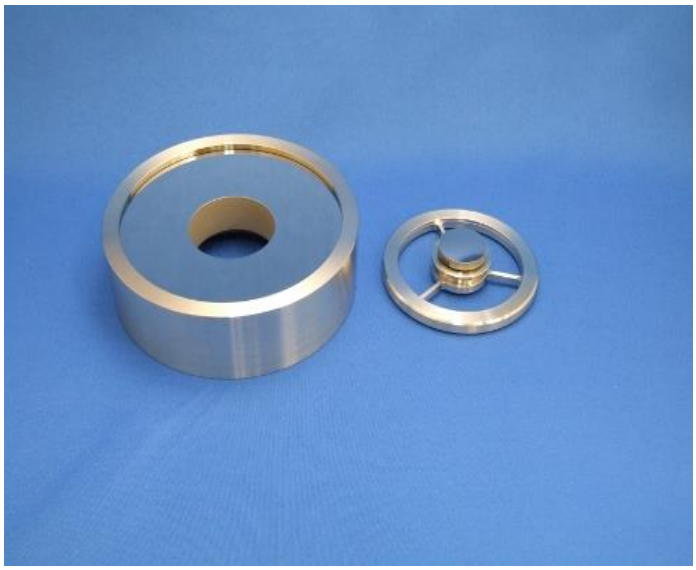
XUV Multilayer Mirrors

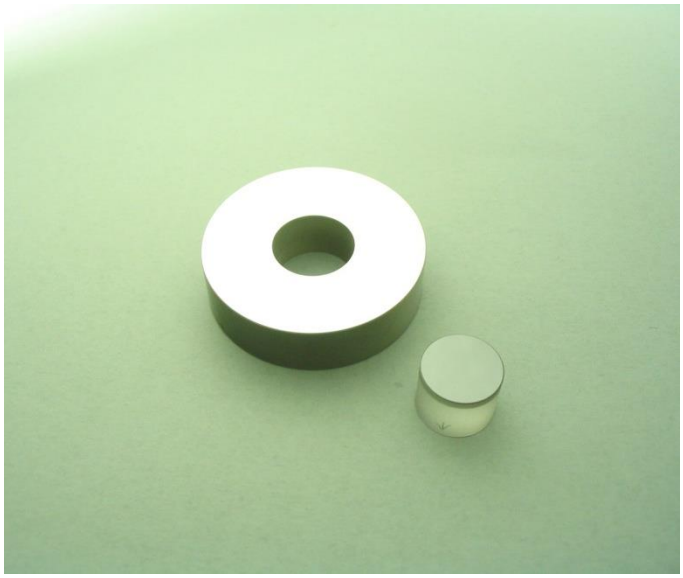
NTT Advanced Technology Corporation

NTT Advanced Technology have been developing and supplying multilayer mirrors (MLMs) for extreme ultraviolet (XUV) region from mid 1990's. Since, the products were used in a lot of fields such as astronomy, XUV photoelectron spectroscopy, XUV microscopy, EUV lithography, plasma physics, and attosecond science.

For high-quality MLM fabrications, no only fabrication techniques but also optical design know-how is necessary. We have been supplying a lot of kinds of MLMs for XUV region, corresponding to the customers' requirements, such as high reflectivity, broad bandwidth, narrow bandwidth, and high contrast. High thermal tolerance MLMs and high damage threshold MLMs have also been supplied.

Our fabrication techniques and optical design know-how will support your research and developments. Please kindly find the detail information of our XUV MLMs for suitable for your experiments. Please kindly contact us, custom design MLMs will be also designed for you.

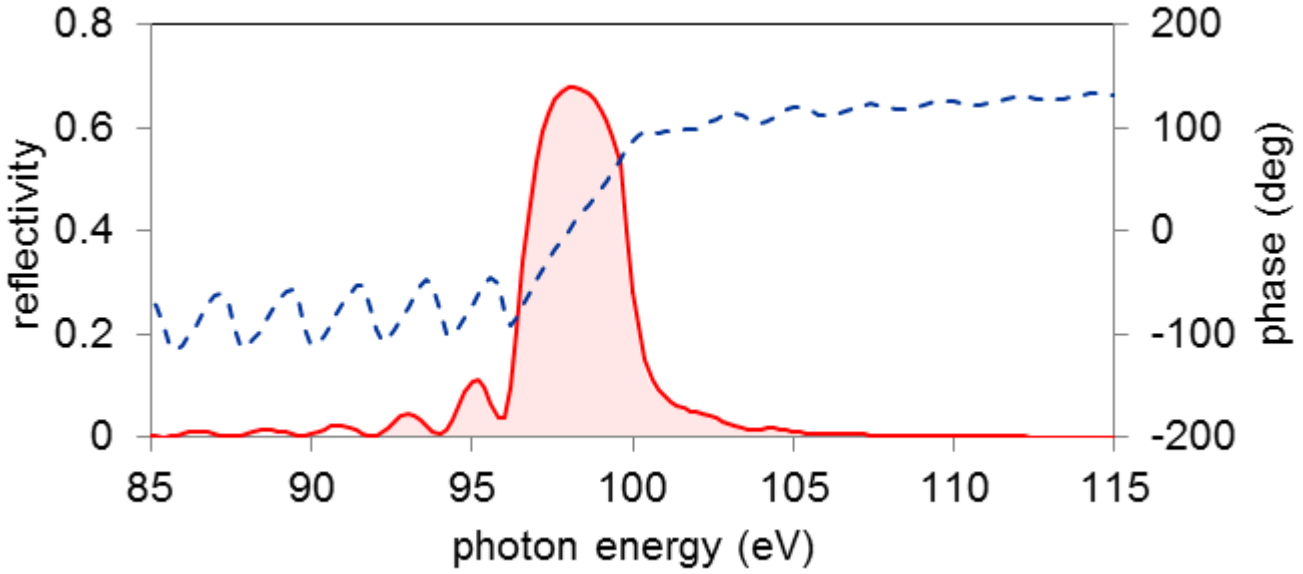




High reflectivity XUV MLMs are useful for several application as a steering device and a focusing device. They are also used for X-ray telescope and X-ray microscopy.

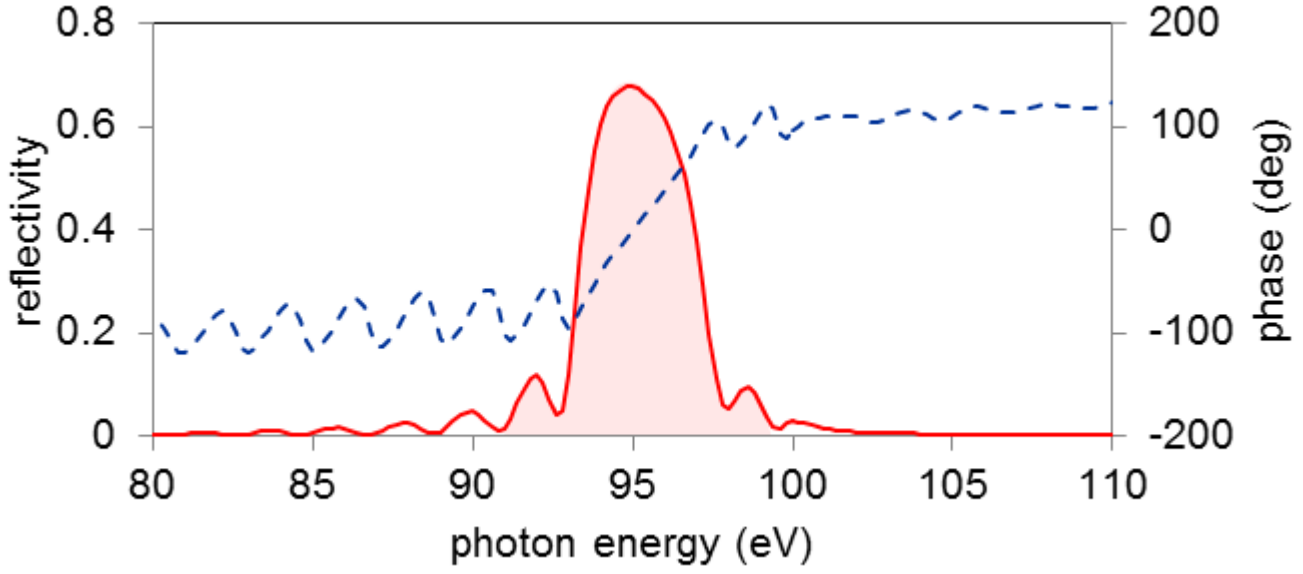
No	design name	AOI	pol.	peak energy	reflectivity	bandwidth (FWHM)
1	HR-98-3.4	5 deg	s	98 eV (12.7 nm)	67.7%	3.4 eV (0.4 nm)
2	HR-95-3.8	5 deg	s	95 eV (13.1 nm)	67.7%	3.8 eV (0.5 nm)
3	HR-90-3.8	5 deg	s	90 eV (13.8 nm)	68.0%	3.8 eV (0.6 nm)
4	HR-85-4.0	5 deg	s	85 eV (14.6 nm)	66.8%	4.0 eV (0.7 nm)
5	HR-80-4.0	5 deg	s	80 eV (15.5 nm)	63.3%	4.0 eV (0.8 nm)
6	HR-75-4.6	5 deg	s	75 eV (16.5 nm)	54.5%	4.6 eV (1.0 nm)
7	HR-70-2.6	5 deg	s	70 eV (17.7 nm)	52.1%	2.6 eV (0.7 nm)
8	HR-65-2.6	5 deg	s	65 eV (19.1 nm)	48.5%	2.6 eV (0.8 nm)
9	HR-60-2.8	5 deg	s	60 eV (20.7 nm)	43.7%	2.8 eV (1.0 nm)
10	HR-55-3.6	5 deg	s	55 eV (22.5 nm)	37.3%	3.6 eV (1.5 nm)
11	HR-50-4.2	5 deg	s	50 eV (24.8 nm)	30.9%	4.2 eV (2.1 nm)
12	HR-48-2.0	5 deg	s	48 eV (25.8 nm)	50.6%	2.0 eV (1.1 nm)
13	HR-45-2.4	5 deg	s	45 eV (27.6 nm)	48.4%	2.4 eV (1.4 nm)
14	HR-40-2.6	5 deg	s	40 eV (31.0 nm)	44.8%	2.6 eV (2.0 nm)
15	HR-35-2.6	5 deg	s	35 eV (35.4 nm)	43.1%	2.6 eV (2.6 nm)
16	HR-30-3.0	5 deg	s	30 eV (41.3 nm)	41.2%	3.0 eV (4.1 nm)
17	HR45-90-6.0	45 deg	s	90 eV (13.1 nm)	66.1%	6.0 eV (0.9 nm)
18	HR45-80-7.4	45 deg	s	80 eV (15.5 nm)	60.0%	7.4 eV (1.4 nm)
19	HR45-70-36.0	45 deg	s	70 eV (17.7 nm)	49.0%	3.6 eV (0.9 nm)
20	HR45-60-5.4	45 deg	s	60 eV (20.7 nm)	40.8%	5.4 eV (1.8 nm)
21	HR45-50-10.0	45 deg	s	50 eV (24.8 nm)	30.0%	10.0 eV (5.1 nm)
22	HR45-40-5.0	45 deg	s	40 eV (31.0 nm)	44.4%	5.0 eV (3.8 nm)
23	HR45-30-7.0	45 deg	s	30 eV (41.3 nm)	42.5%	7.0 eV (9.3 nm)

HR-98-3.4



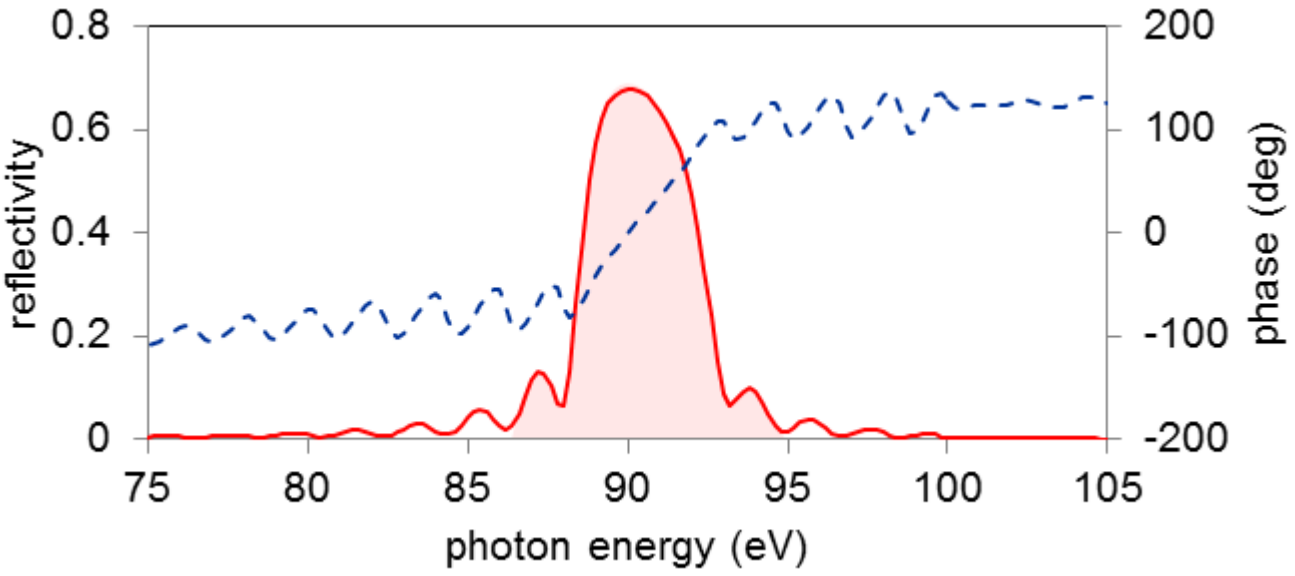
Design name	HR-98-3.4
AOI	5 deg
polarization	s
peak energy	98 eV (12.7 nm)
peak reflectivity	67.7%
bandwidth (FWHM)	3.4 eV (0.4 nm)

HR-95-3.8



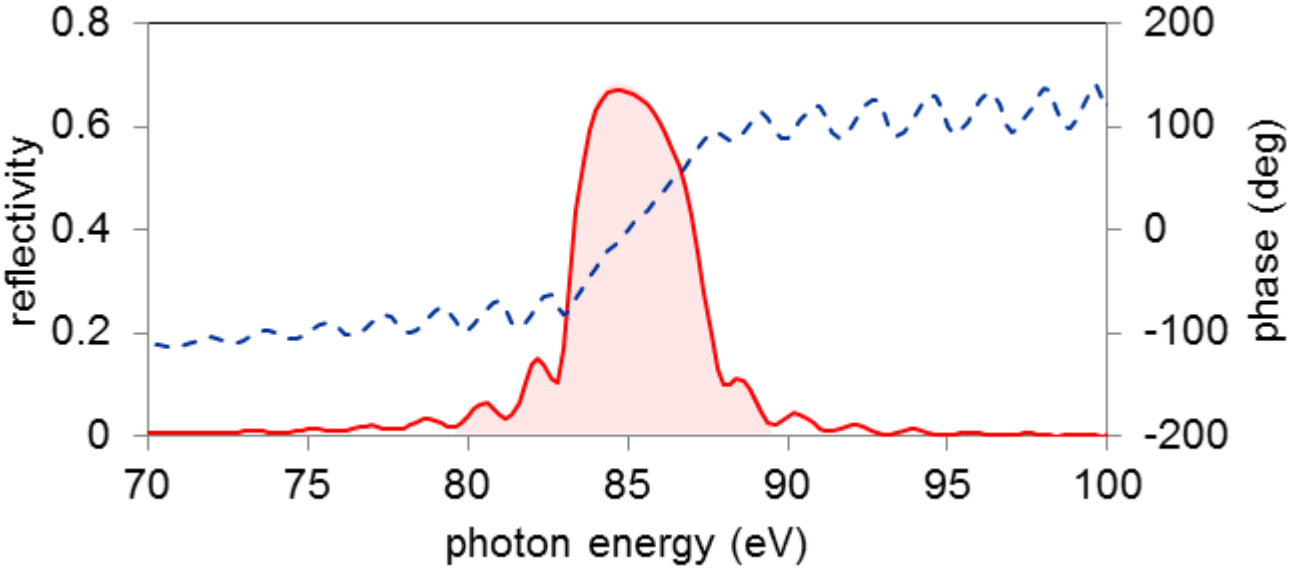
Design name	HR-95-3.8
AOI	5 deg
polarization	s
peak energy	95 eV (13.1 nm)
peak reflectivity	67.7%
bandwidth (FWHM)	3.8 eV (0.5 nm)

HR-90-3.8



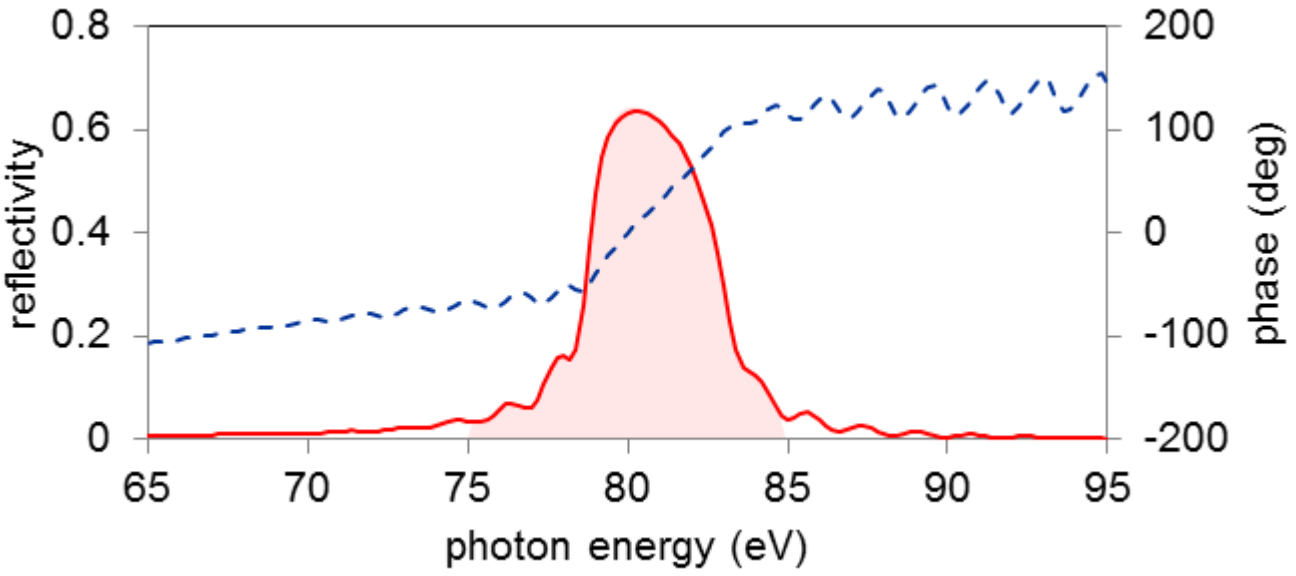
Design name	HR-90-3.8
AOI	5 deg
polarization	s
peak energy	90 eV (13.8 nm)
peak reflectivity	68.0%
bandwidth (FWHM)	3.8 eV (0.6 nm)

HR-85-4.0



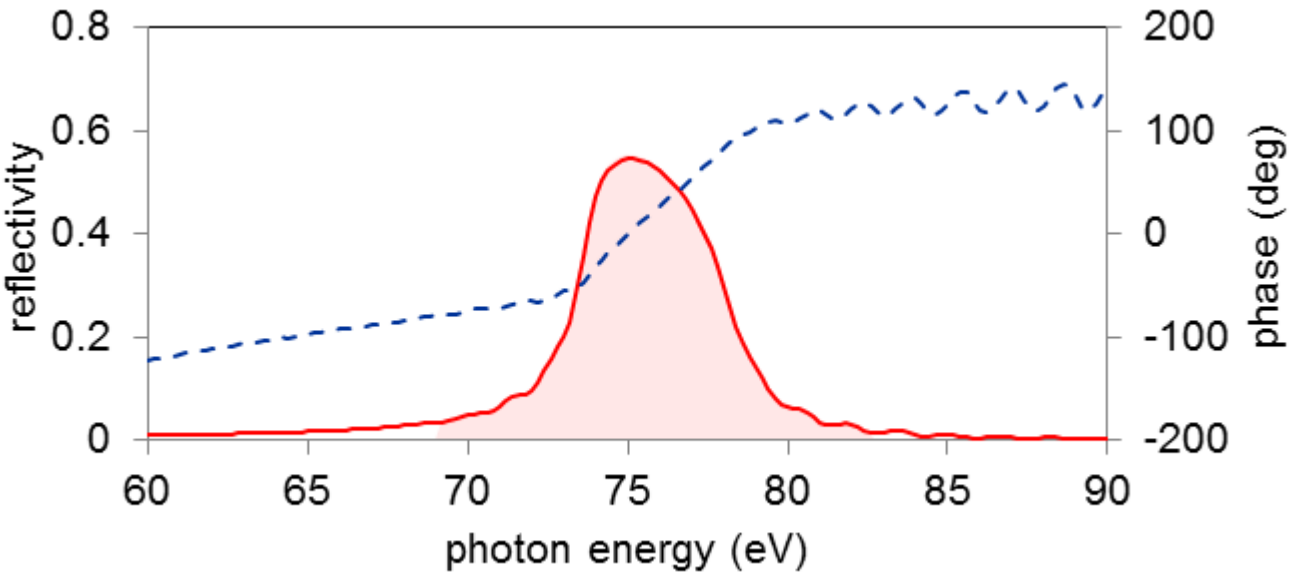
Design name	HR-85-4.0
AOI	5 deg
polarization	s
peak energy	85 eV (14.6 nm)
peak reflectivity	66.8%
bandwidth (FWHM)	4.0 eV (0.7 nm)

HR-80-4.0



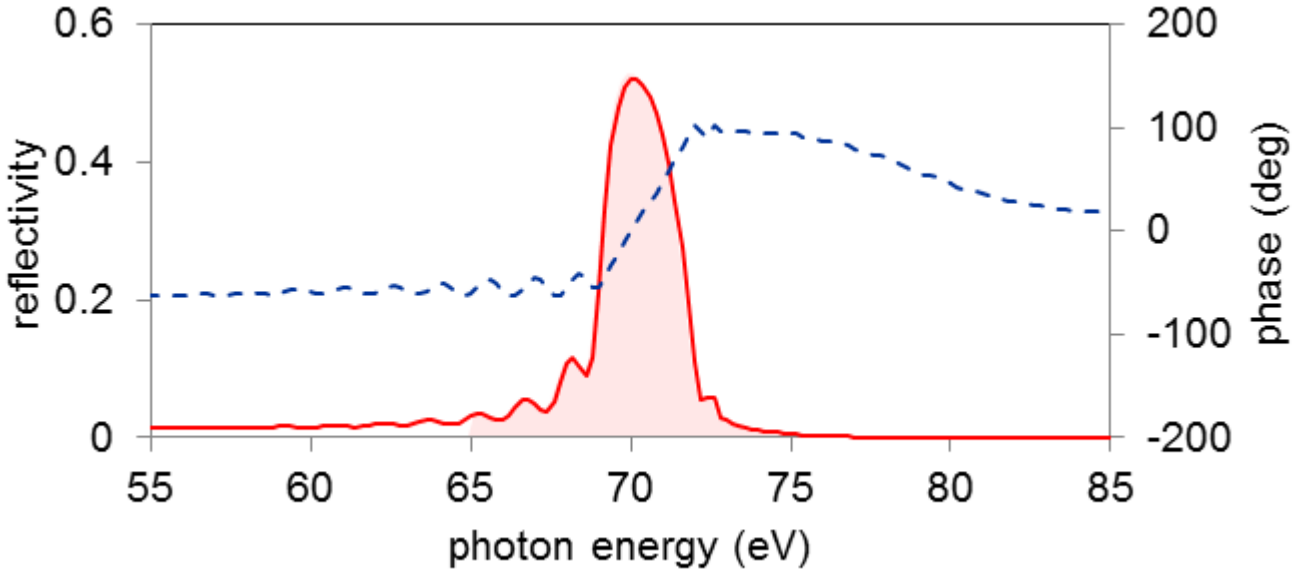
Design name	HR-80-4.0
AOI	5 deg
polarization	s
peak energy	80 eV (15.5 nm)
peak reflectivity	63.3%
bandwidth (FWHM)	4.0 eV (0.8 nm)

HR-75-4.6



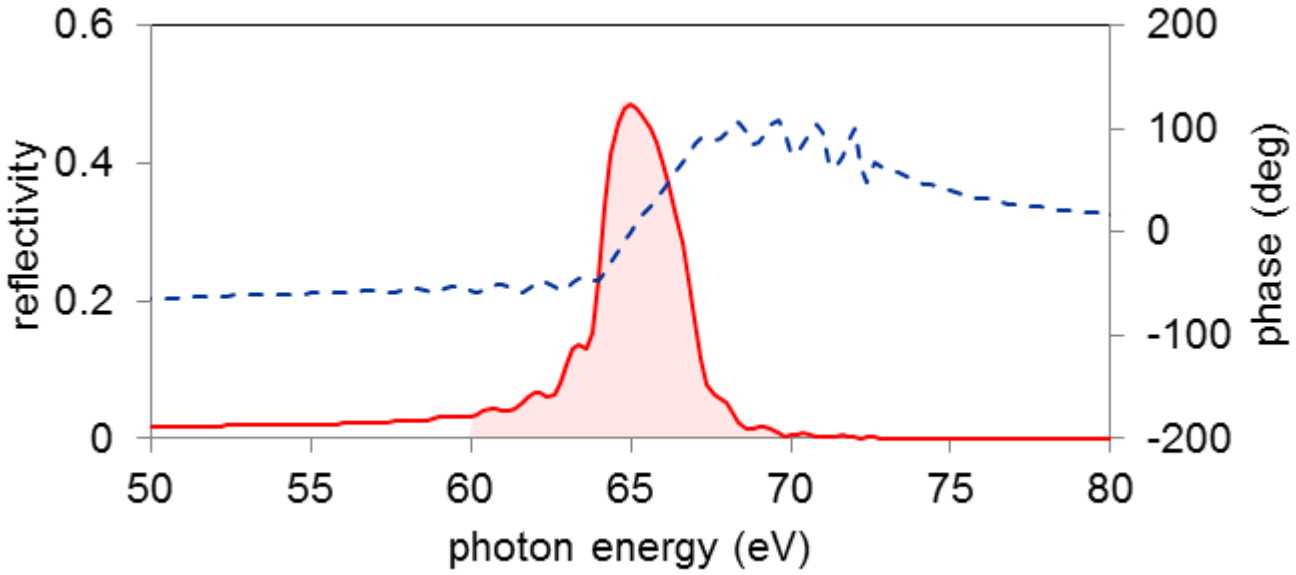
Design name	HR-75-4.6
AOI	5 deg
polarization	s
peak energy	75 eV (16.5 nm)
peak reflectivity	54.5%
bandwidth (FWHM)	4.6 eV (1.0 nm)

HR-70-2.6



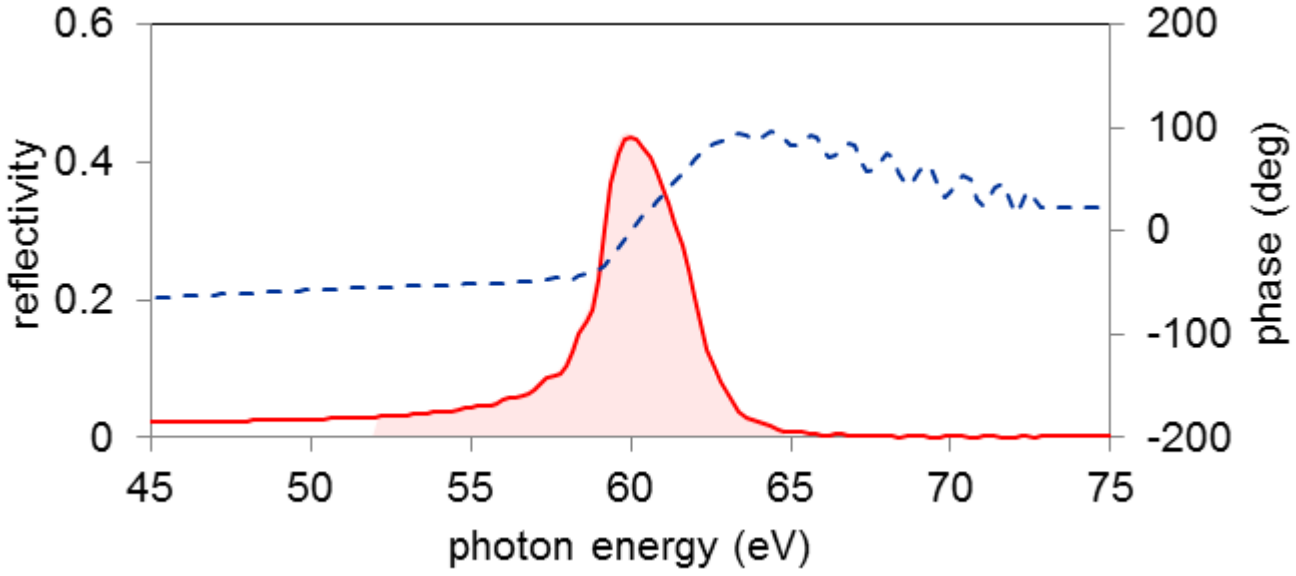
Design name	HR-70-2.6
AOI	5 deg
polarization	s
peak energy	70 eV (17.7 nm)
peak reflectivity	52.1%
bandwidth (FWHM)	2.6 eV (0.7 nm)

HR-65-2.6



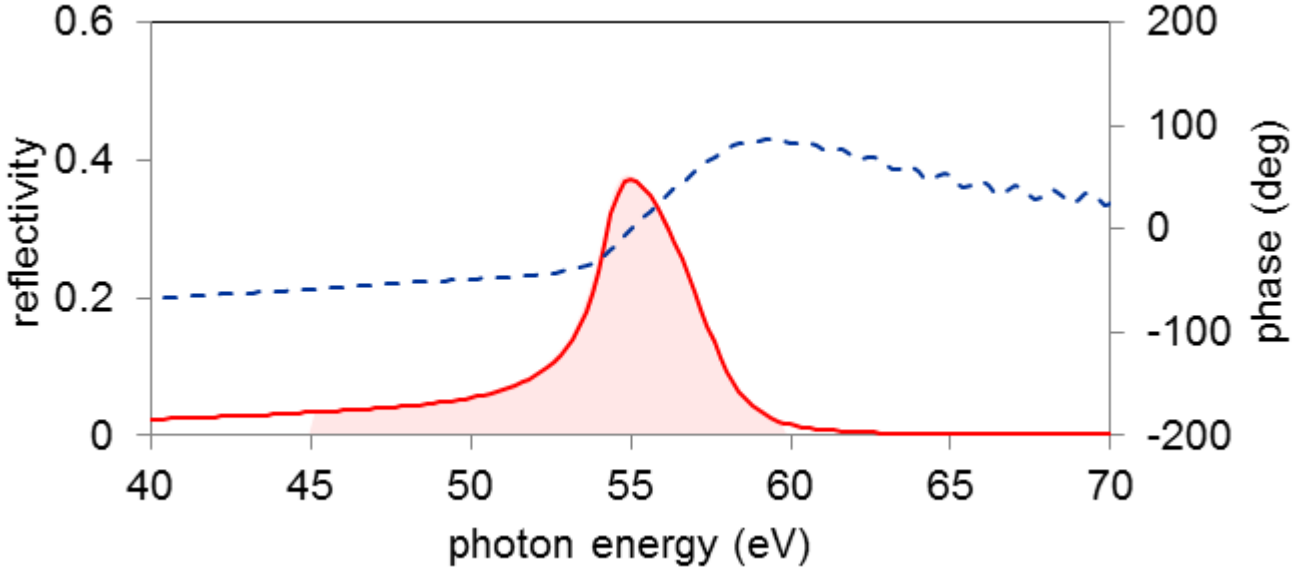
Design name	HR-65-2.6
AOI	5 deg
polarization	s
peak energy	65 eV (19.1 nm)
peak reflectivity	48.5%
bandwidth (FWHM)	2.6 eV (0.8 nm)

HR-60-2.8



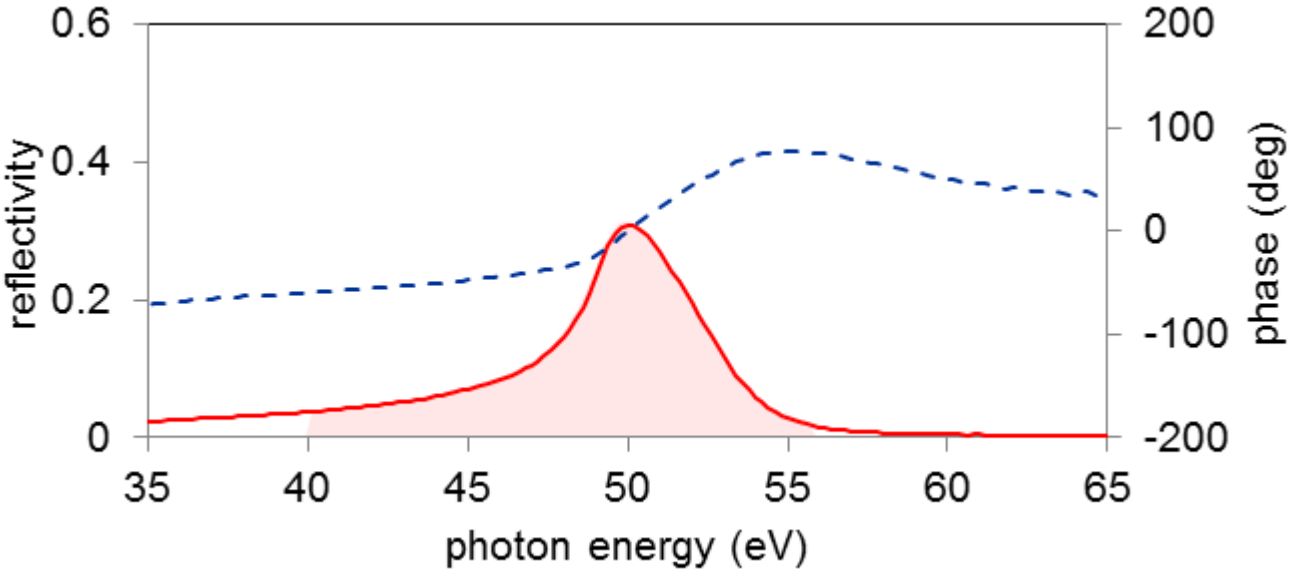
Design name	HR-60-2.8
AOI	5 deg
polarization	s
peak energy	60 eV (20.7 nm)
peak reflectivity	43.7%
bandwidth (FWHM)	2.8 eV (1.0 nm)

HR-55-3.6



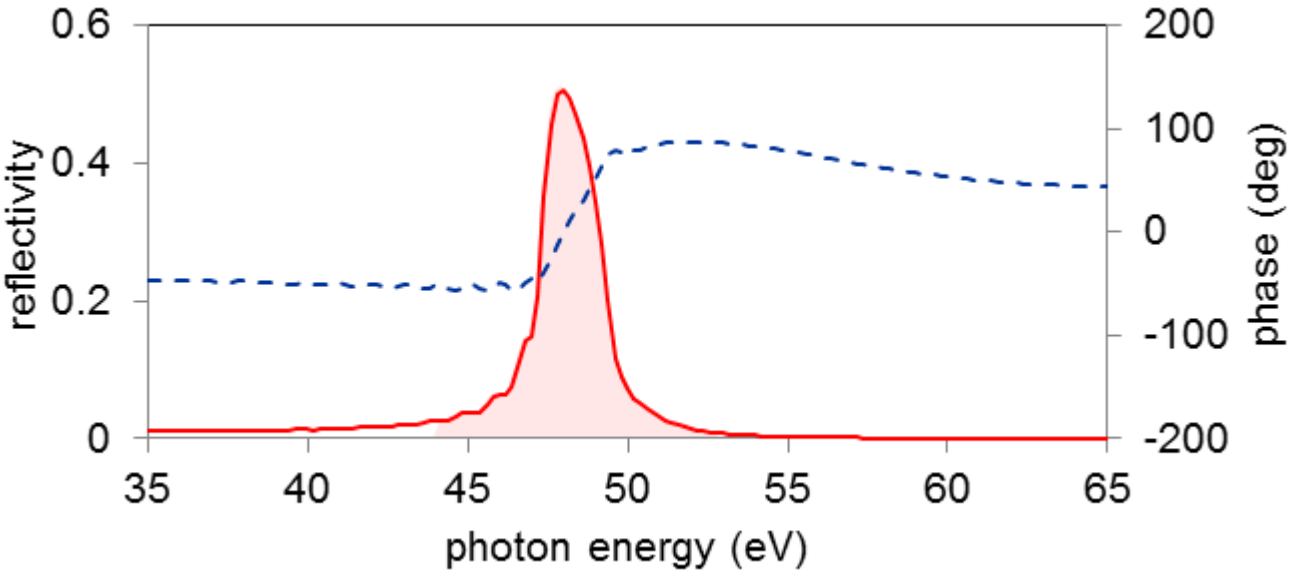
Design name	HR-55-3.6
AOI	5 deg
polarization	s
peak energy	55 eV (22.5 nm)
peak reflectivity	37.3%
bandwidth (FWHM)	3.6 eV (1.5 nm)

HR-50-4.2



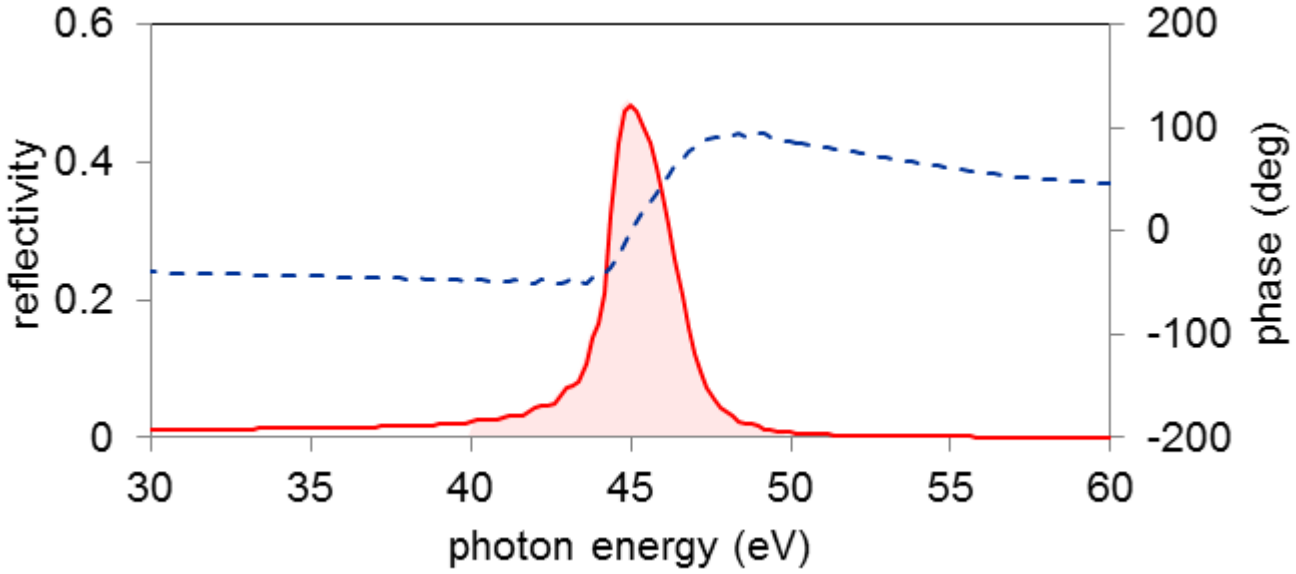
Design name	HR-50-4.2
AOI	5 deg
polarization	s
peak energy	50 eV (24.8 nm)
peak reflectivity	30.9%
bandwidth (FWHM)	4.2 eV (2.1 nm)

HR-48-2.0



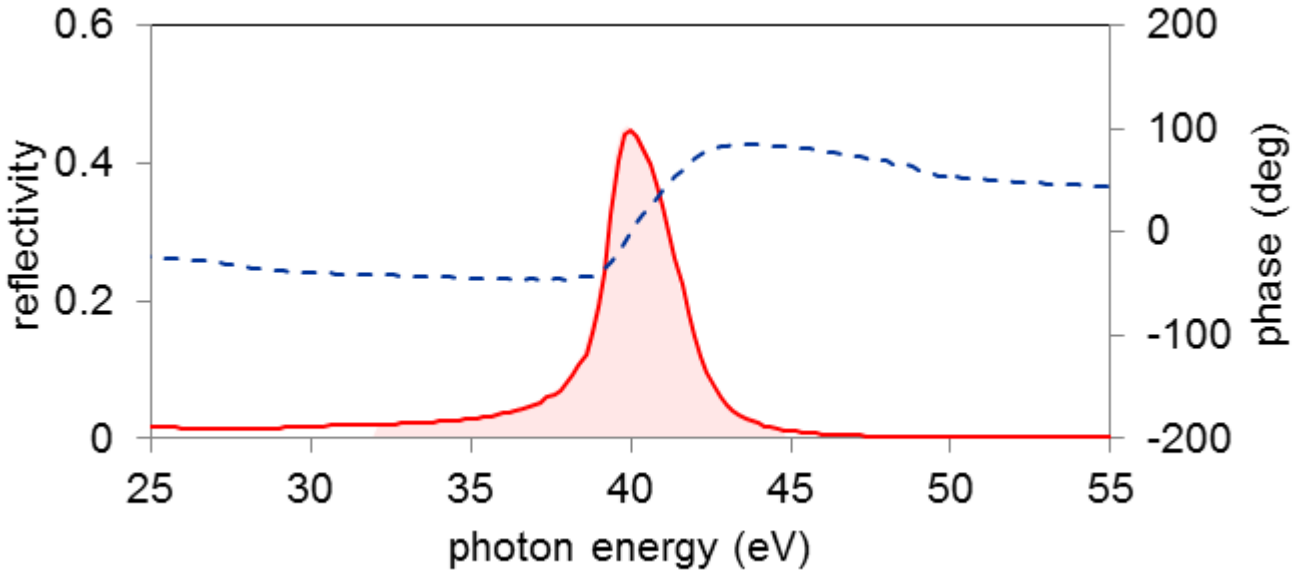
Design name	HR-48-2.0
AOI	5 deg
polarization	s
peak energy	48 eV (25.8 nm)
peak reflectivity	50.6%
bandwidth (FWHM)	2.0 eV (1.1 nm)

HR-45-2.4



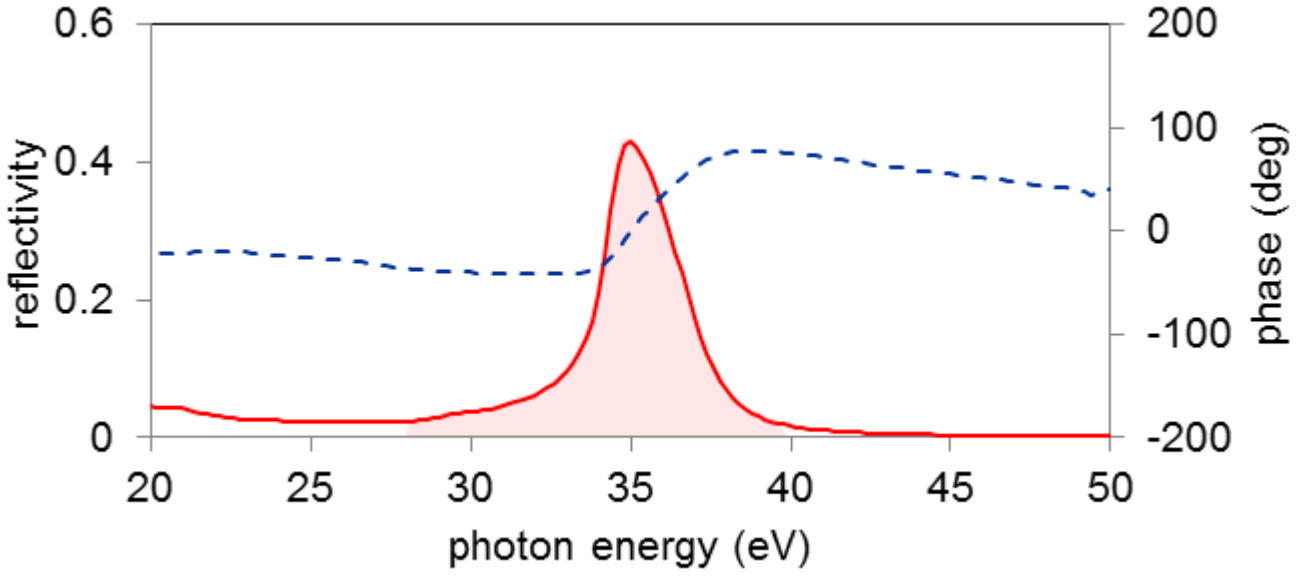
Design name	HR-45-2.4
AOI	5 deg
polarization	s
peak energy	45 eV (27.6 nm)
peak reflectivity	48.4%
bandwidth (FWHM)	2.4 eV (1.4 nm)

HR-40-2.6



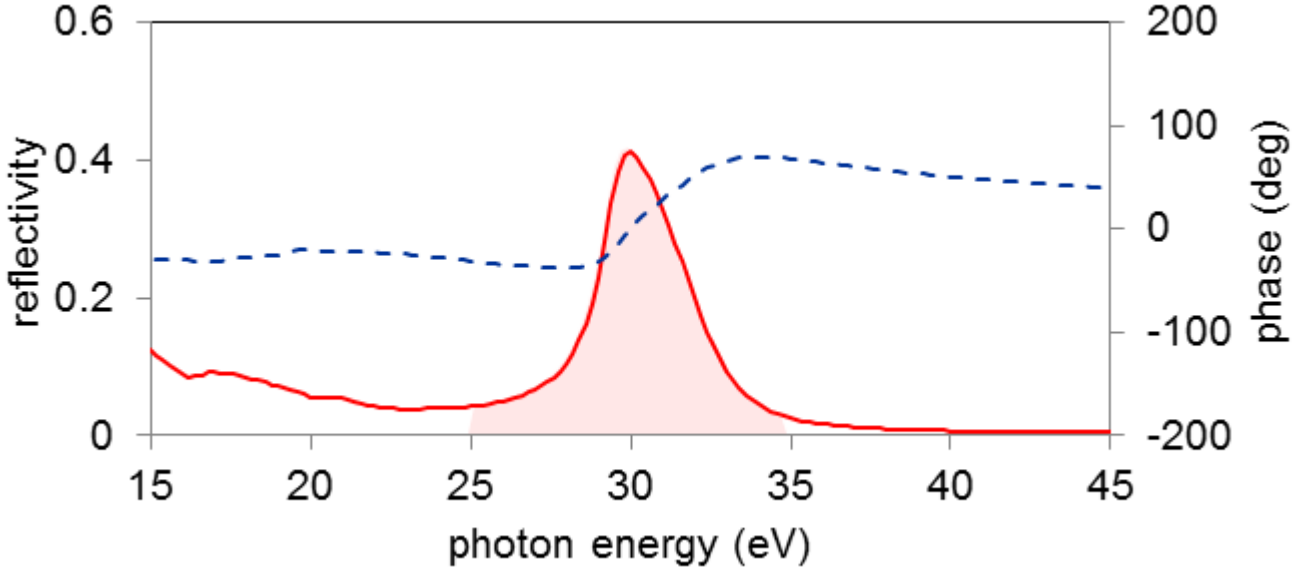
Design name	HR-40-2.6
AOI	5 deg
polarization	s
peak energy	40 eV (31 nm)
peak reflectivity	44.8%
bandwidth (FWHM)	2.6 eV (2.0 nm)

HR-35-2.6



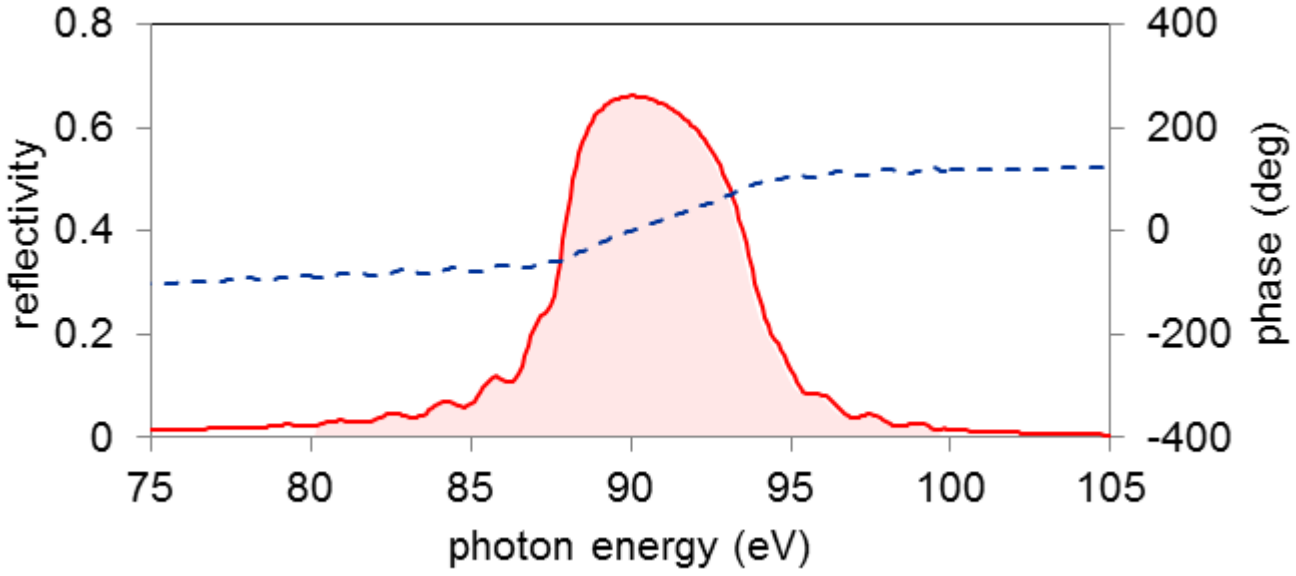
Design name	HR-35-2.6
AOI	5 deg
polarization	s
peak energy	35 eV (35.4 nm)
peak reflectivity	43.1%
bandwidth (FWHM)	2.6 eV (2.6 nm)

HR-30-3.0



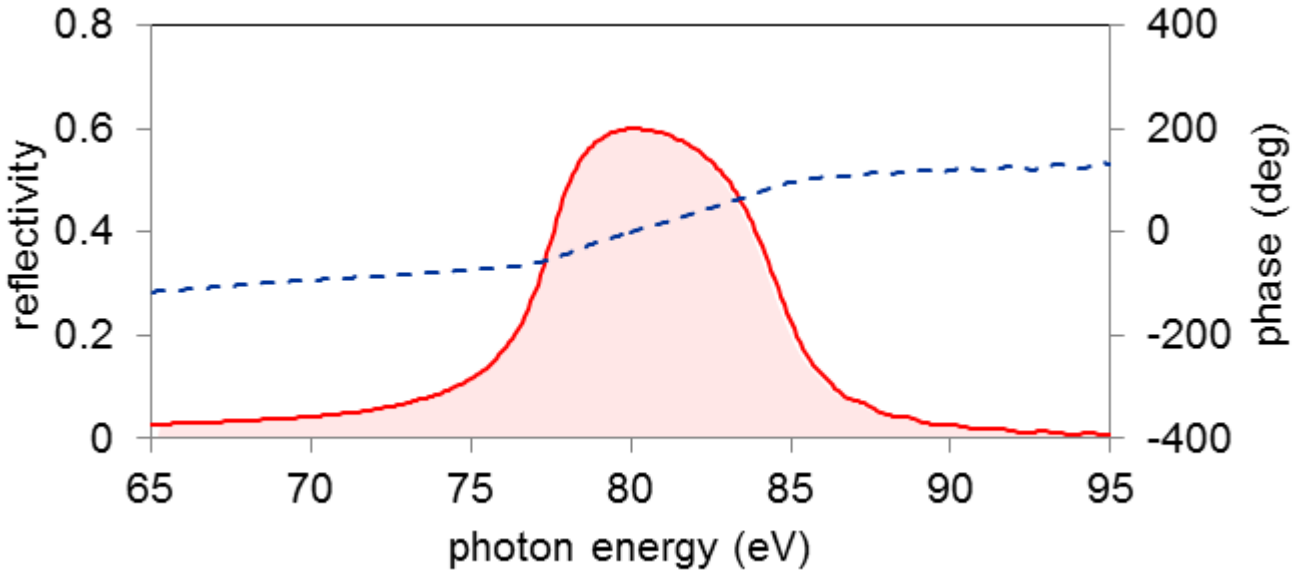
Design name	HR-30-3.0
AOI	5 deg
polarization	s
peak energy	30 eV (41.3 nm)
peak reflectivity	41.2%
bandwidth (FWHM)	3.0 eV (4.1 nm)

HR45-90-6.0



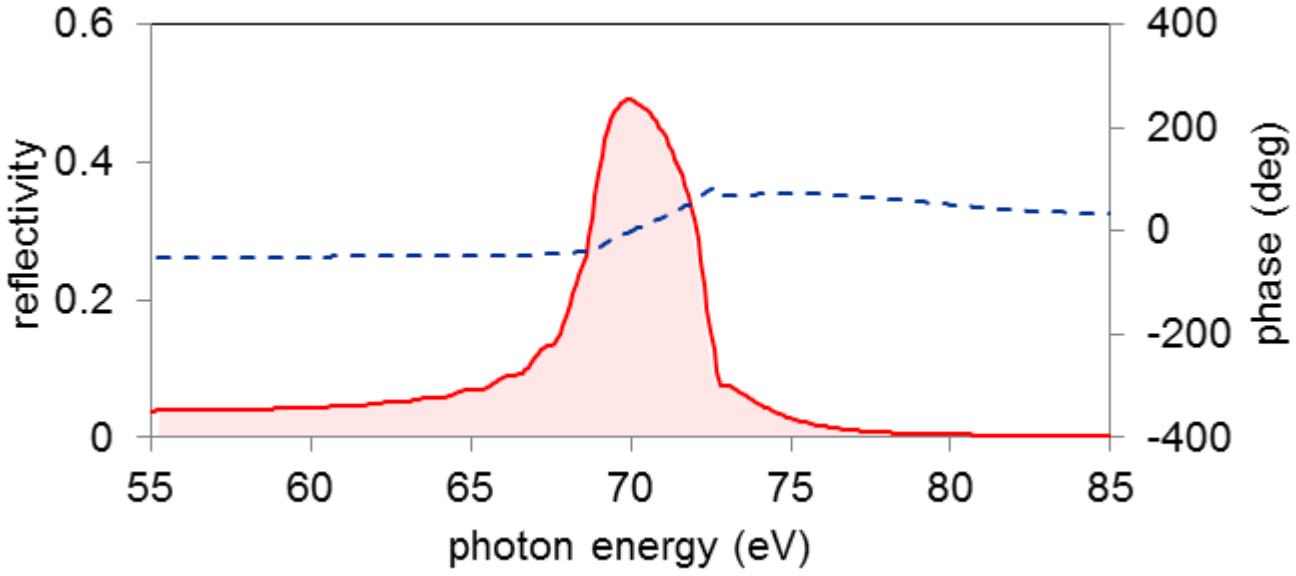
Design name	HR45-90-6.0
AOI	45 deg
polarization	s
peak energy	90 eV (13.8 nm)
peak reflectivity	66.1%
bandwidth (FWHM)	6.0 eV (0.9 nm)

HR45-80-7.4



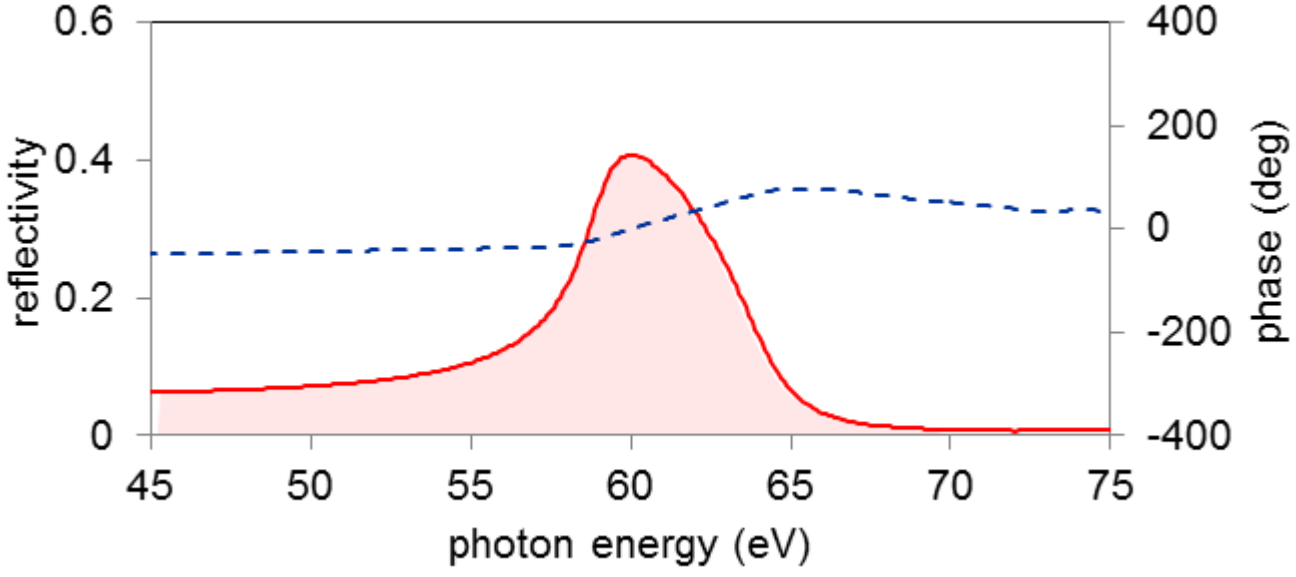
Design name	HR45-80-7.4
AOI	45 deg
polarization	s
peak energy	80 eV (15.5 nm)
peak reflectivity	60.0%
bandwidth (FWHM)	7.4 eV (1.4 nm)

HR45-70-3.6



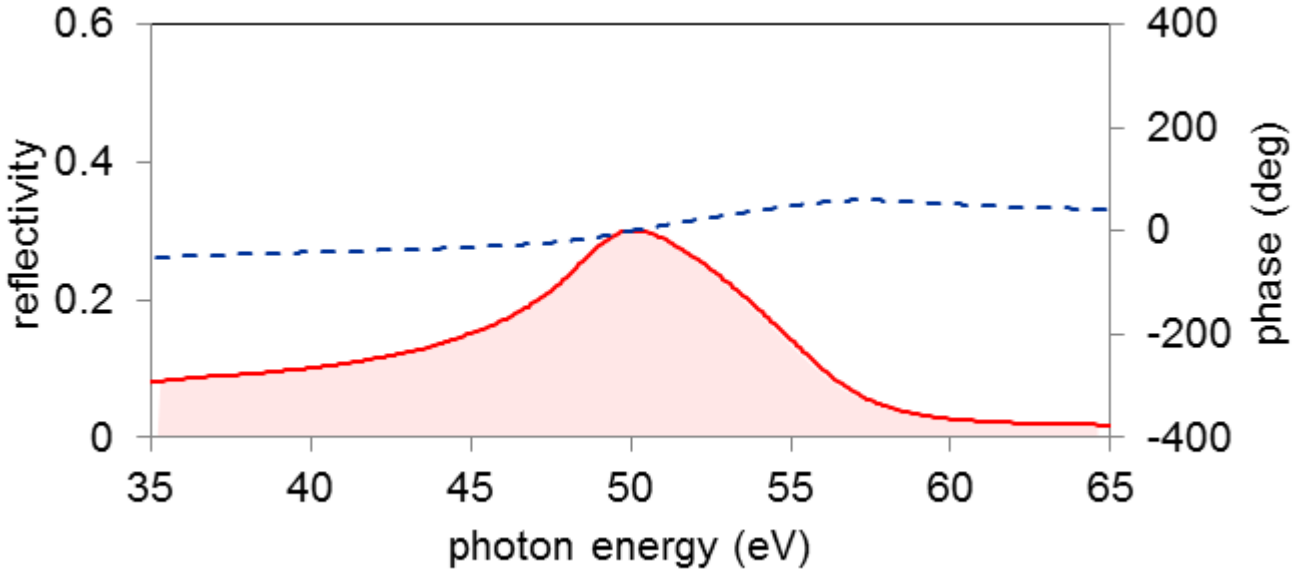
Design name	HR45-70-3.6
AOI	45 deg
polarization	s
peak energy	70 eV (17.7 nm)
peak reflectivity	49.0%
bandwidth (FWHM)	3.6 eV (0.9 nm)

HR45-60-5.4



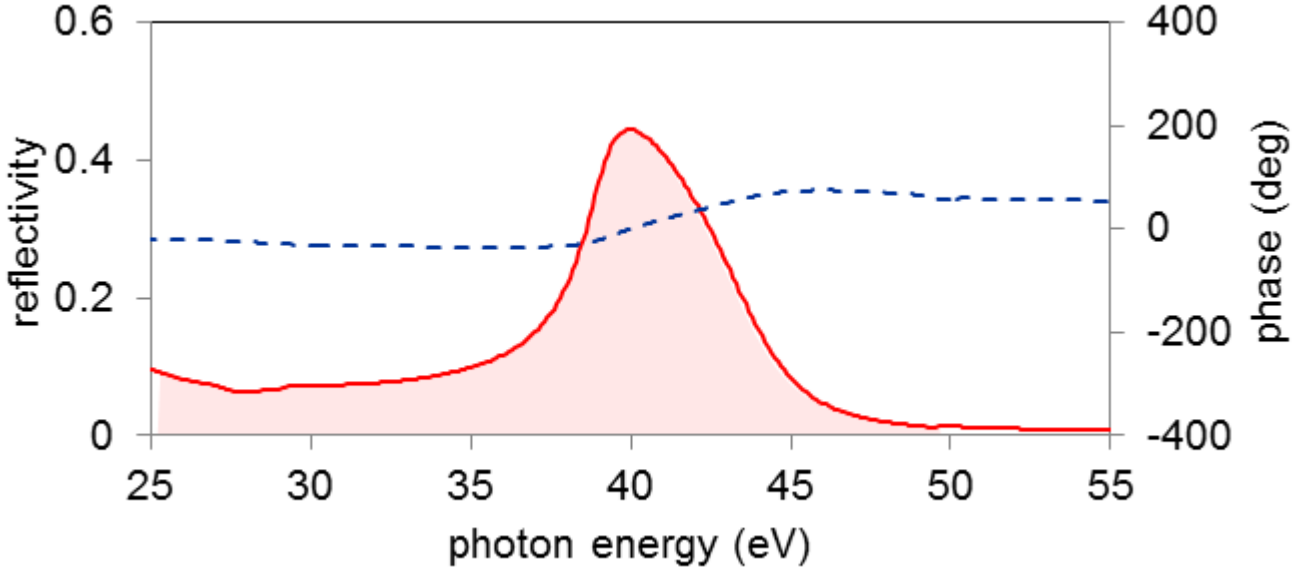
Design name	HR45-60-5.4
AOI	45 deg
polarization	s
peak energy	60 eV (20.7 nm)
peak reflectivity	40.8%
bandwidth (FWHM)	5.4 eV (1.8 nm)

HR45-50-10.0



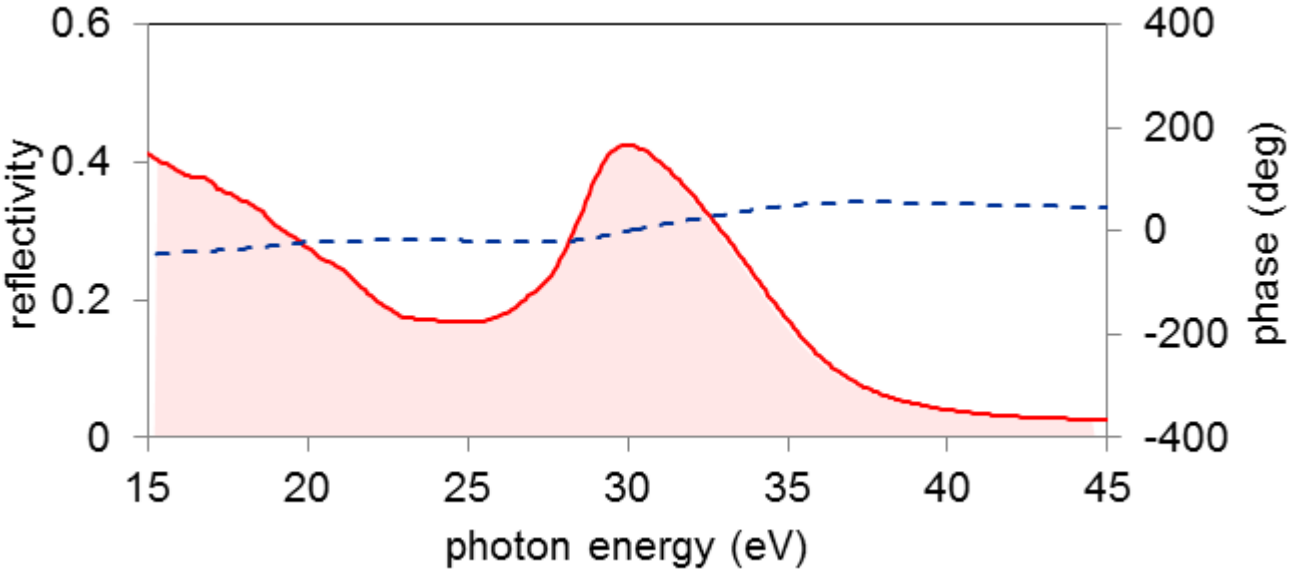
Design name	HR45-50-10.0
AOI	45 deg
polarization	s
peak energy	50 eV (24.8 nm)
peak reflectivity	30.0%
bandwidth (FWHM)	10.0 eV (5.1 nm)

HR45-40-5.0



Design name	HR45-40-5.0
AOI	45 deg
polarization	s
peak energy	40 eV (31 nm)
peak reflectivity	44.4%
bandwidth (FWHM)	5.0 eV (3.8 nm)

HR45-30-7.0

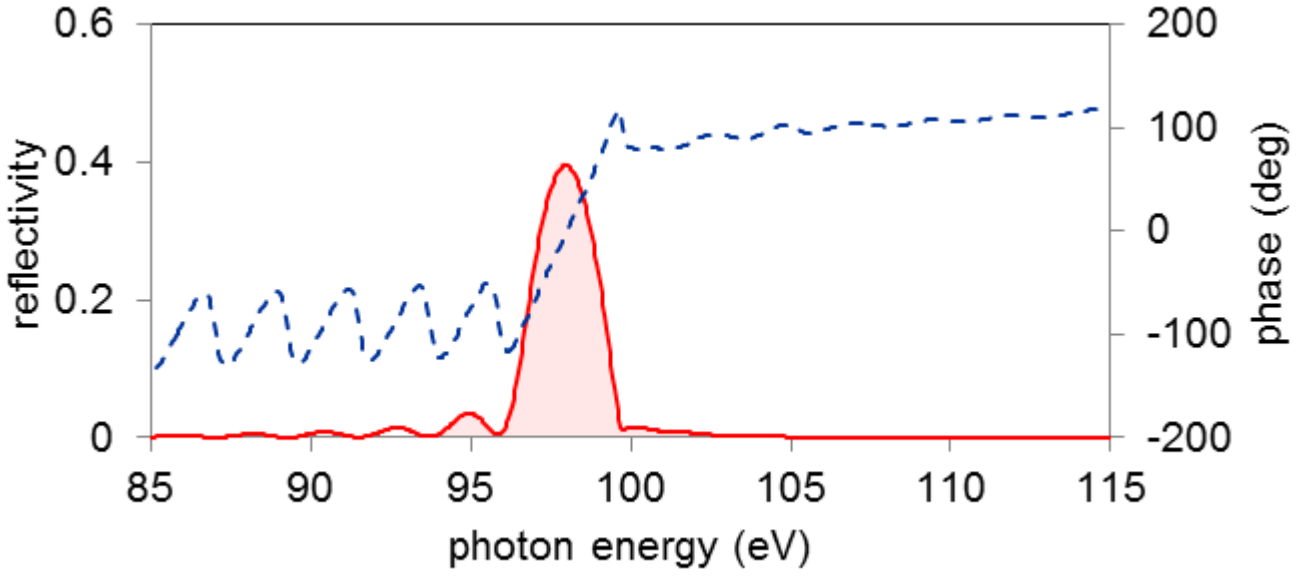


Design name	HR45-30-7.0
AOI	45 deg
polarization	s
peak energy	30 eV (41.3 nm)
peak reflectivity	42.5%
bandwidth (FWHM)	7.0 eV (9.3 nm)

Narrowband XUV MLMs are used as spectroscopy devices, such as XUV spectroscopy, XUV photoelectron spectroscopy, and order isolation for high-order harmonics.

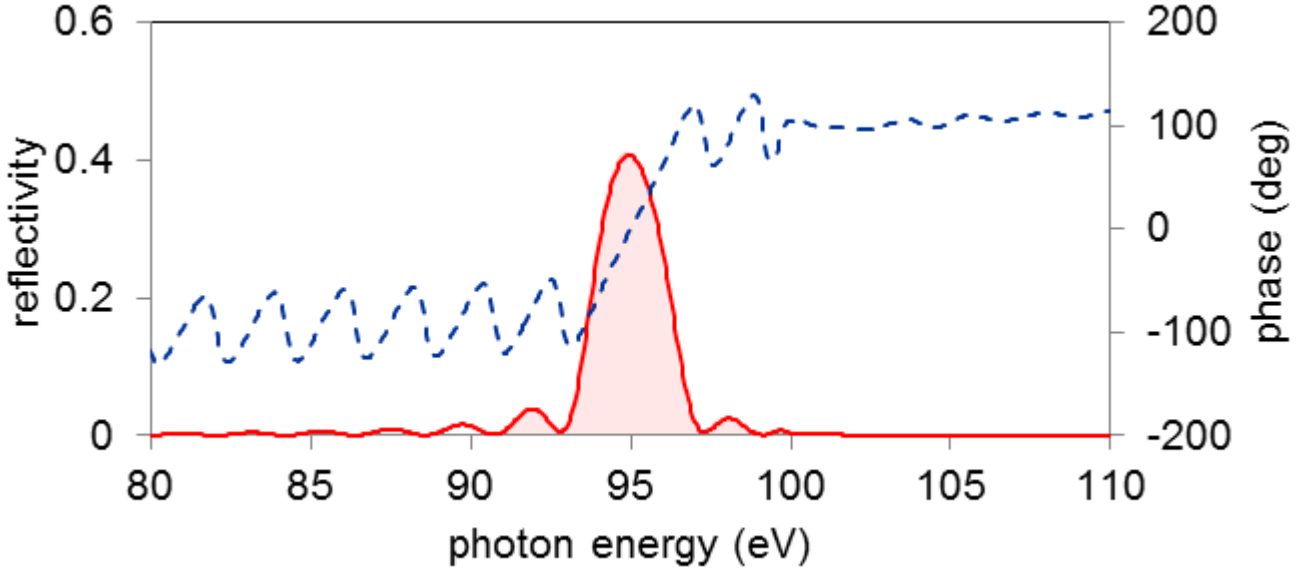
No	design name	AOI	pol.	peak energy	reflectivity	bandwidth (FWHM)
24	NBR-98-2.3	5 deg	s	98 eV (12.7 nm)	39.5%	2.3 eV (0.3 nm)
25	NBR-95-2.6	5 deg	s	95 eV (13.1 nm)	40.7%	2.6 eV (0.4 nm)
26	NBR-90-2.5	5 deg	s	90 eV (13.8 nm)	44.5%	2.5 eV (0.4 nm)
27	NBR-85-2.5	5 deg	s	85 eV (14.6 nm)	48.5%	2.5 eV (0.4 nm)
28	NBR-80-2.5	5 deg	s	80 eV (15.5 nm)	50.1%	2.5 eV (0.5 nm)
29	NBR-75-2.6	5 deg	s	75 eV (16.5 nm)	46.0%	2.6 eV (0.6 nm)
30	NBR-70-1.9	5 deg	s	70 eV (17.7 nm)	43.7%	1.9 eV (0.5 nm)
31	NBR-65-2.1	5 deg	s	65 eV (19.1 nm)	43.5%	2.1 eV (0.6 nm)
32	NBR-60-2.2	5 deg	s	60 eV (20.7 nm)	42.2%	2.2 eV (0.8 nm)
33	NBR-55-2.2	5 deg	s	55 eV (22.5 nm)	38.4%	2.2 eV (1.0 nm)
34	NBR-50-2.7	5 deg	s	50 eV (24.8 nm)	33.5%	2.7 eV (1.3 nm)
35	NBR-48-1.3	5 deg	s	48 eV (25.8 nm)	49.2%	1.3 eV (0.7 nm)
36	NBR-45-1.5	5 deg	s	45 eV (27.6 nm)	47.6%	1.5 eV (0.9 nm)
37	NBR-40-1.5	5 deg	s	40 eV (31.0 nm)	44.8%	1.5 eV (1.1 nm)
38	NBR-35-1.6	5 deg	s	35 eV (35.4 nm)	43.7%	1.6 eV (1.6 nm)
39	NBR-30-1.9	5 deg	s	30 eV (41.3 nm)	42.0%	1.9 eV (2.6 nm)
40	NBR45-90-3.1	45 feg	s	90 eV (12.7 nm)	53.2%	3.1 eV (0.5 nm)
41	NBR45-70-2.6	45 feg	s	70 eV (17.7 nm)	45.6%	2.6 eV (0.7 nm)
42	NBR45-40-2.9	45 feg	s	40 eV (31.0 nm)	46.5%	2.9 eV (2.2 nm)

NBR-98-3.4



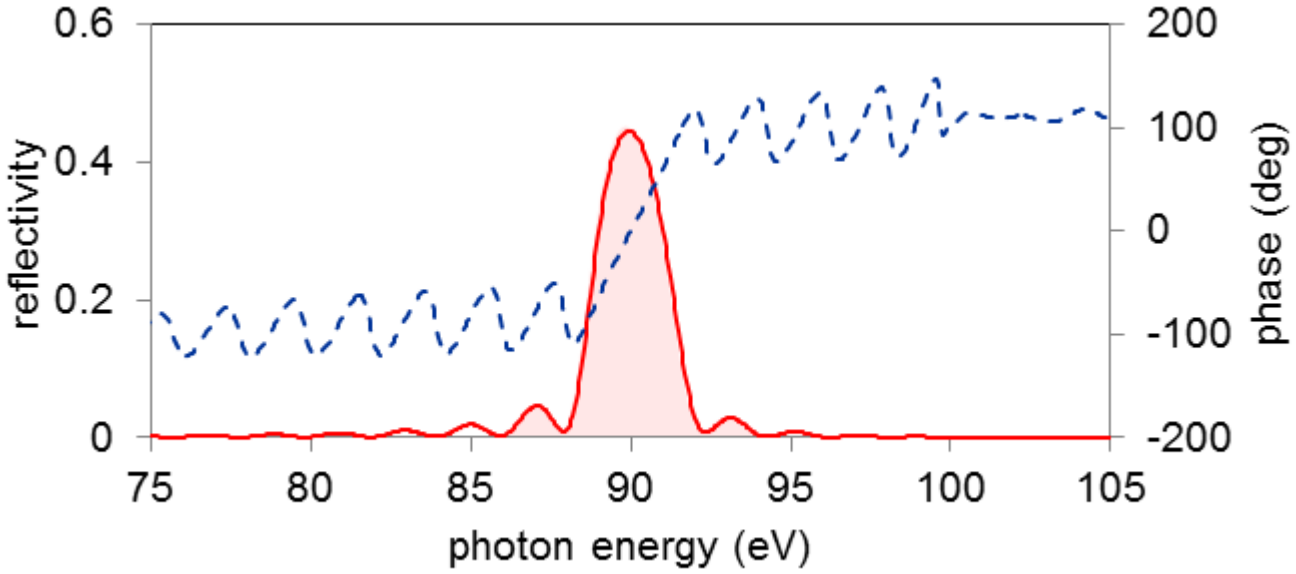
Design name	NRB-98-2.3
AOI	5 deg
polarization	s
peak energy	98 eV (12.7 nm)
peak reflectivity	39.5%
bandwidth (FWHM)	2.3 eV (0.3 nm)

NBR-95-2.6



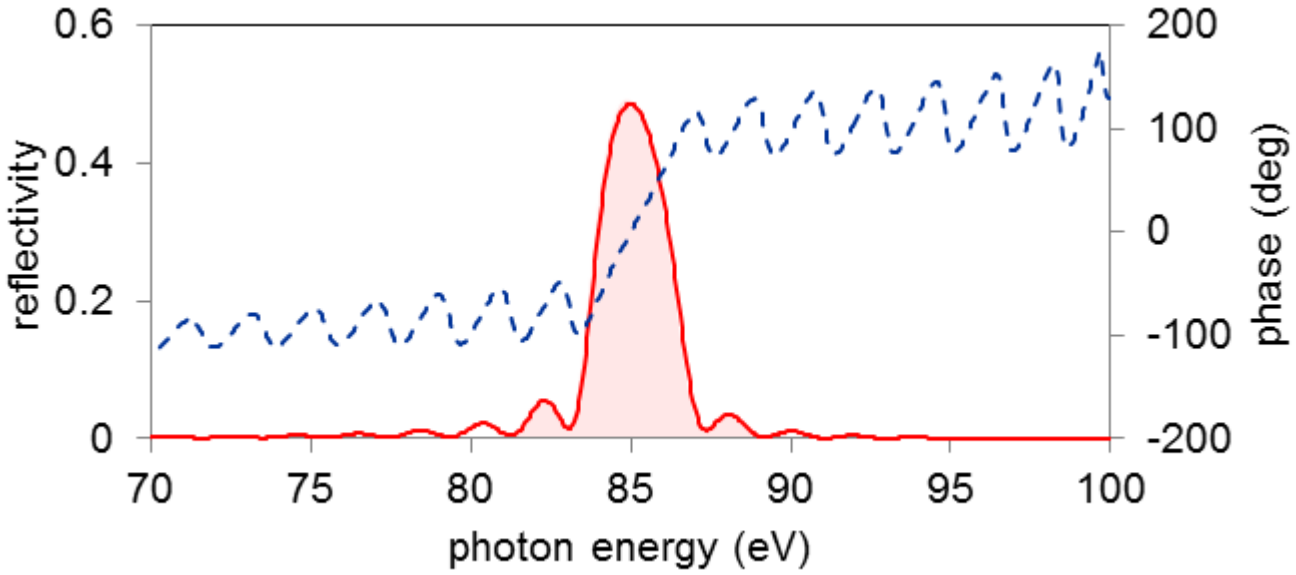
Design name	NNR-95-2.6
AOI	5 deg
polarization	s
peak energy	95 eV (13.1 nm)
peak reflectivity	40.7%
bandwidth (FWHM)	2.6 eV (0.4 nm)

NBR-90-2.5



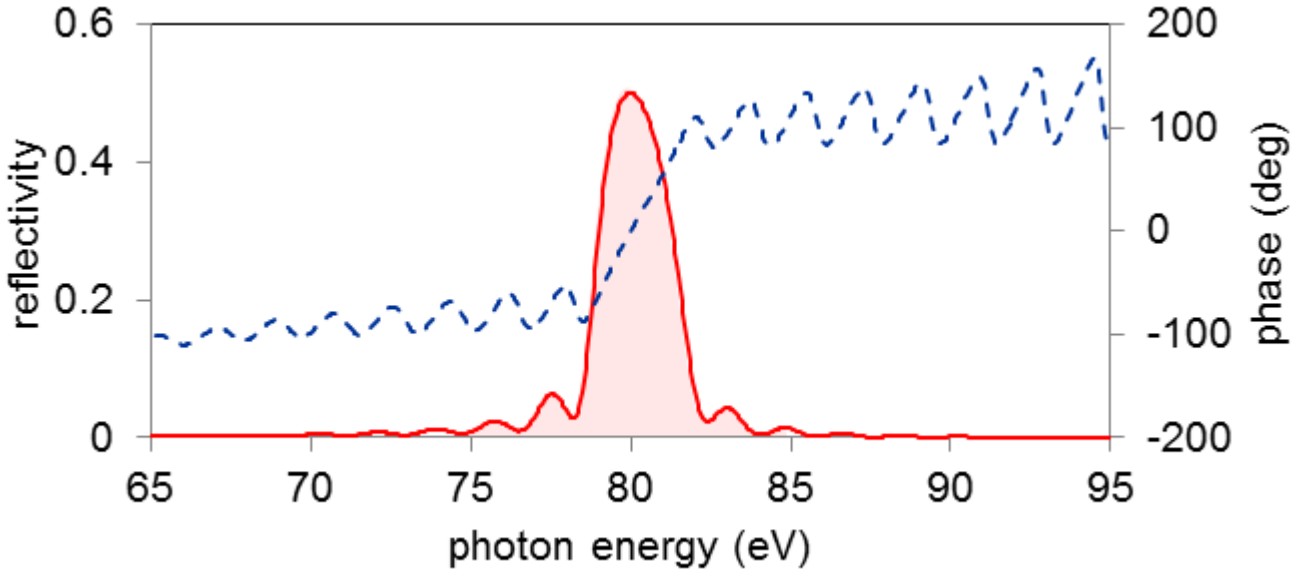
Design name	NRB-90-2.5
AOI	5 deg
polarization	s
peak energy	90 eV (13.8 nm)
peak reflectivity	44.5%
bandwidth (FWHM)	2.5 eV (0.4 nm)

NBR-85-2.5



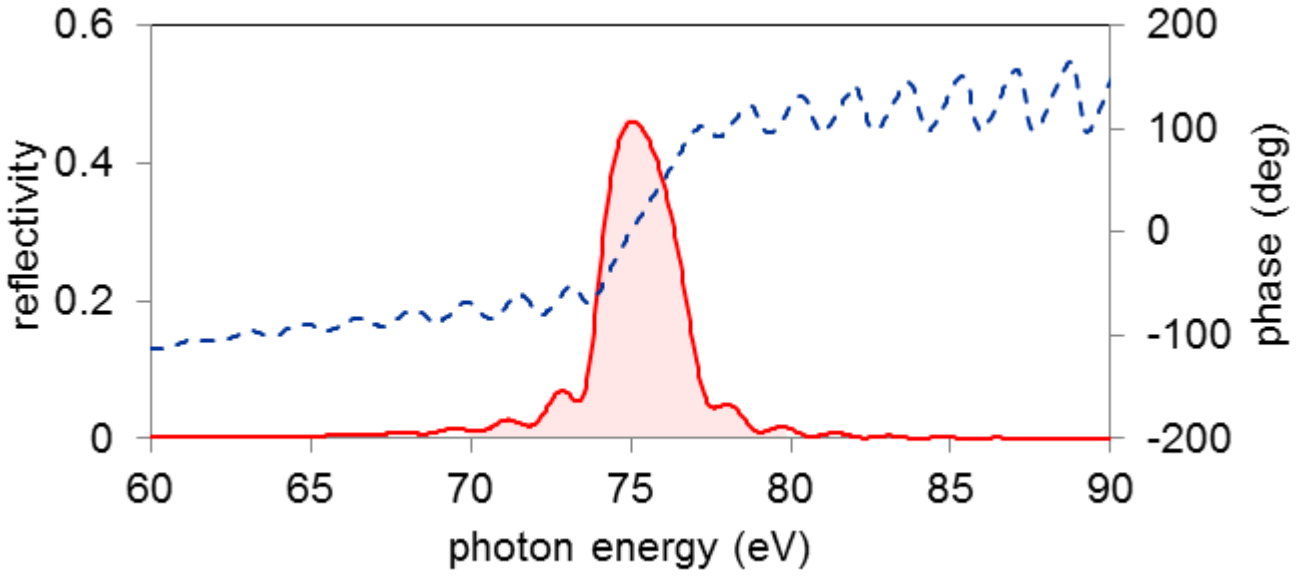
Design name	NNR-85-2.5
AOI	5 deg
polarization	s
peak energy	85 eV (14.6 nm)
peak reflectivity	48.5%
bandwidth (FWHM)	2.5 eV (0.4 nm)

NBR-80-2.5



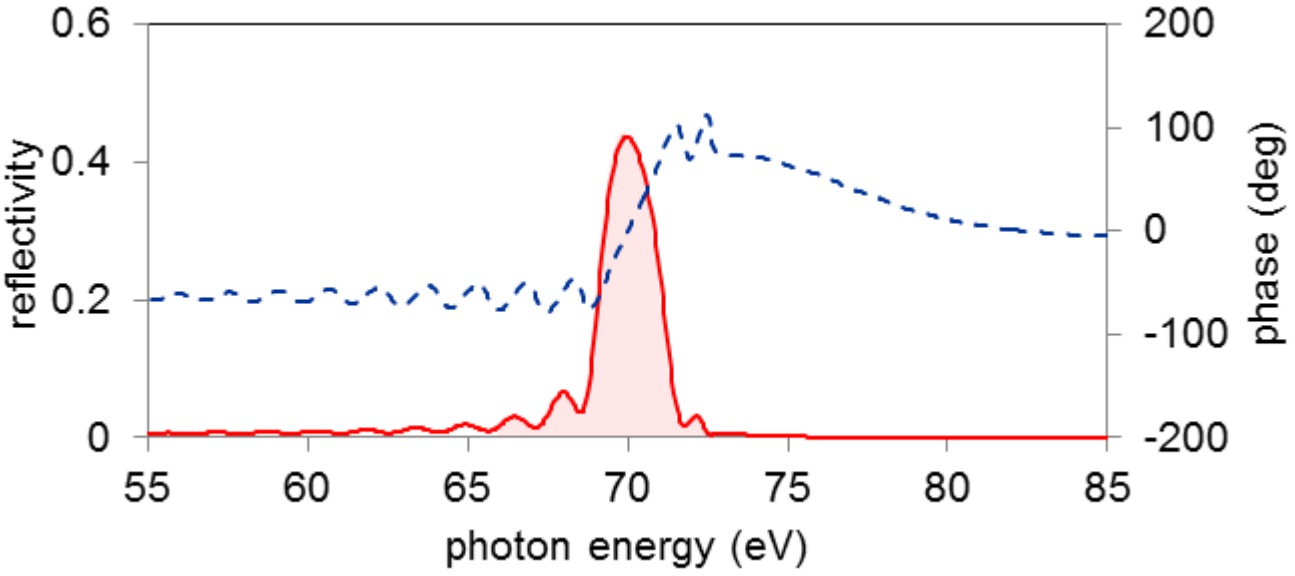
Design name	NRB-80-2.5
AOI	5 deg
polarization	s
peak energy	80 eV (15.5 nm)
peak reflectivity	50.1%
bandwidth (FWHM)	2.5 eV (0.5 nm)

NBR-75-2.6



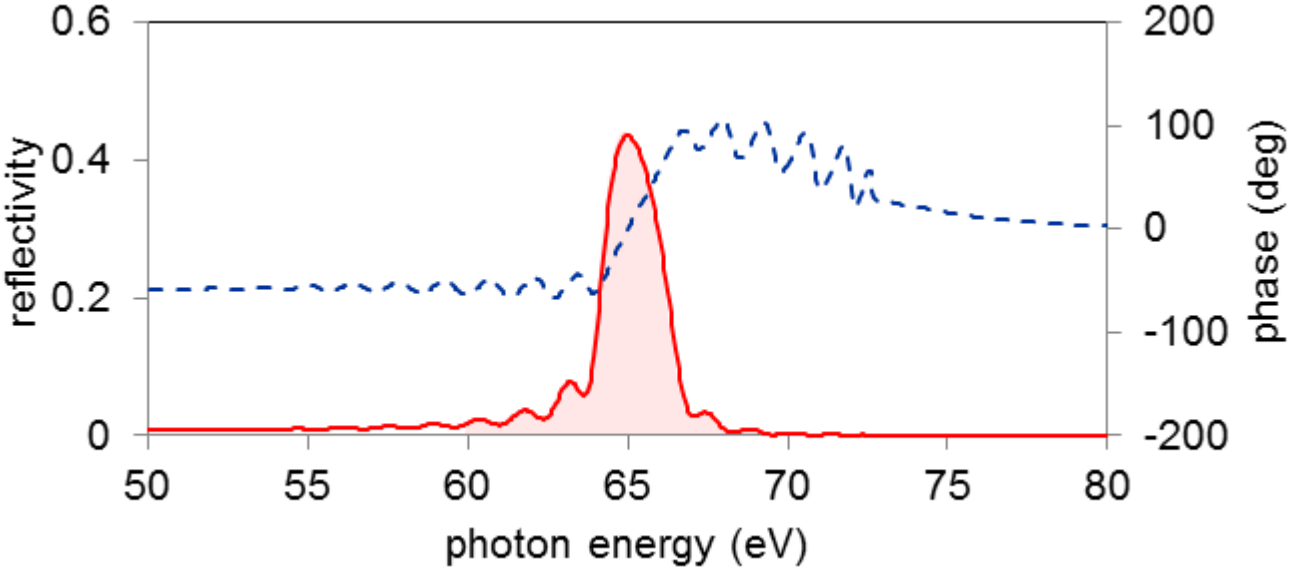
Design name	NNR-75-2.6
AOI	5 deg
polarization	s
peak energy	75 eV (16.5 nm)
peak reflectivity	46.0%
bandwidth (FWHM)	2.6 eV (0.6 nm)

NBR-70-1.9



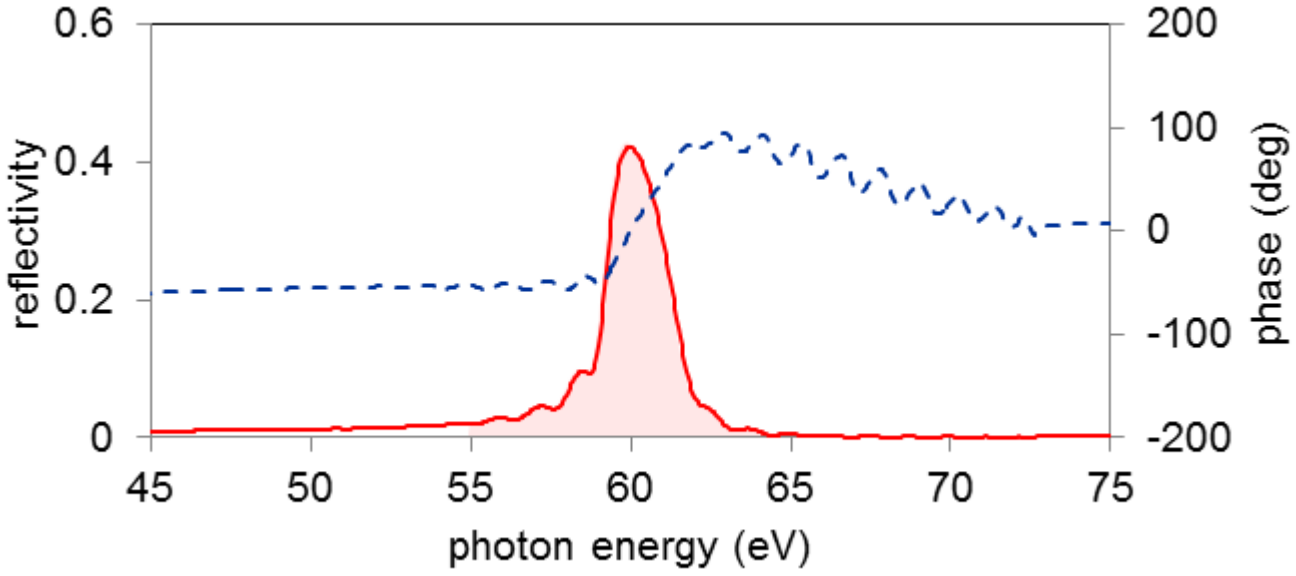
Design name	NRB-70-1.9
AOI	5 deg
polarization	s
peak energy	70 eV (17.7 nm)
peak reflectivity	43.7%
bandwidth (FWHM)	1.9 eV (0.5 nm)

NBR-65-2.1



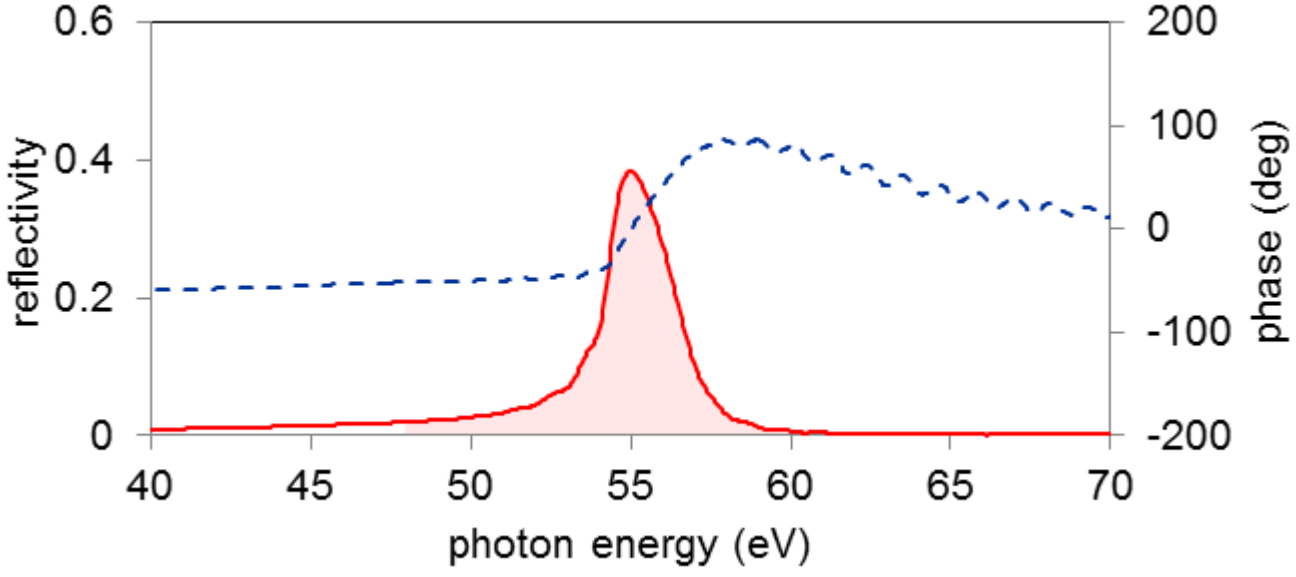
Design name	NNR-65-2.1
AOI	5 deg
polarization	s
peak energy	65 eV (19.1 nm)
peak reflectivity	43.5%
bandwidth (FWHM)	2.1 eV (0.6 nm)

NBR-60-2.2



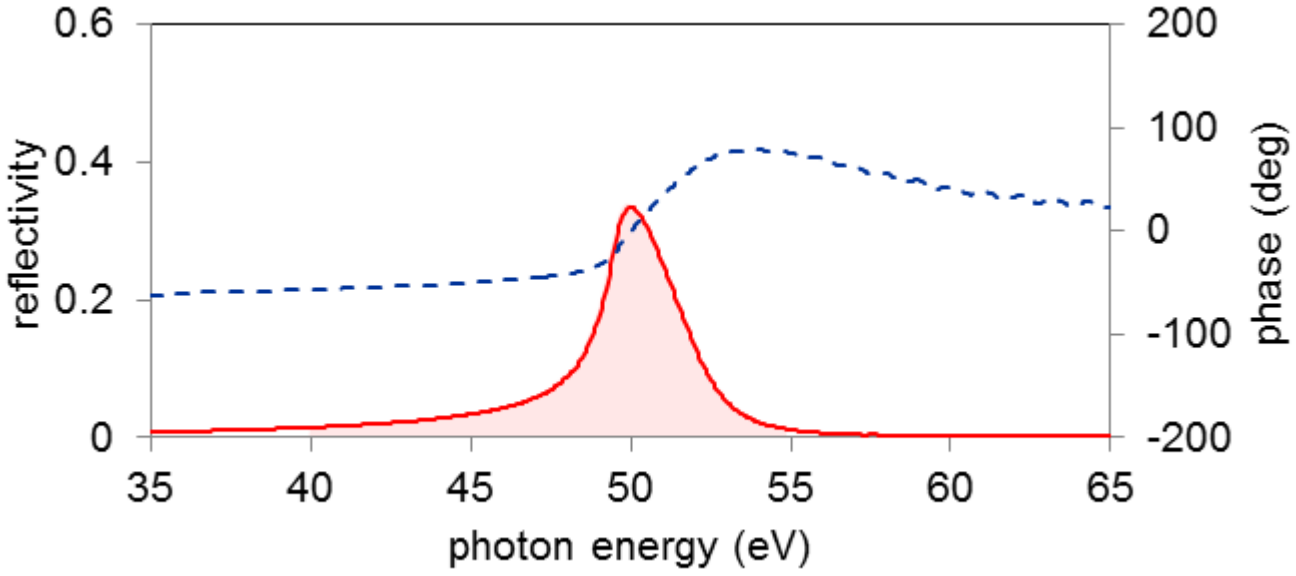
Design name	NRB-60-2.2
AOI	5 deg
polarization	s
peak energy	60 eV (20.7 nm)
peak reflectivity	42.2%
bandwidth (FWHM)	2.2 eV (0.8 nm)

NBR-55-2.4



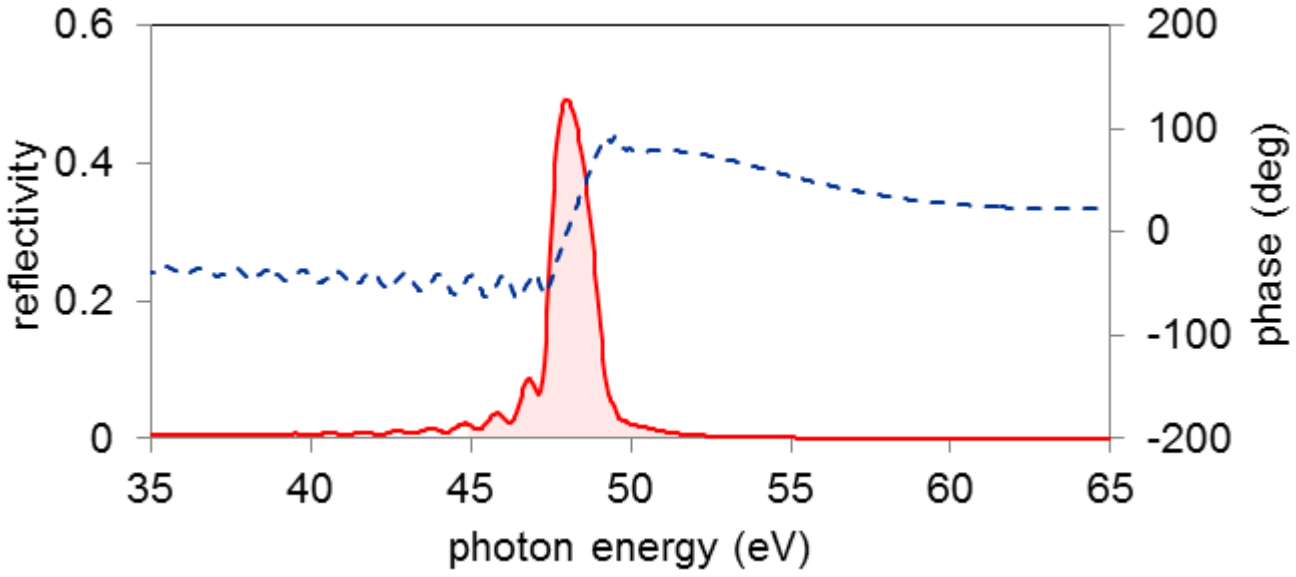
Design name	NNR-55-2.4
AOI	5 deg
polarization	s
peak energy	55 eV (22.5 nm)
peak reflectivity	38.4%
bandwidth (FWHM)	2.4 eV (1 nm)

NBR-50-2.7



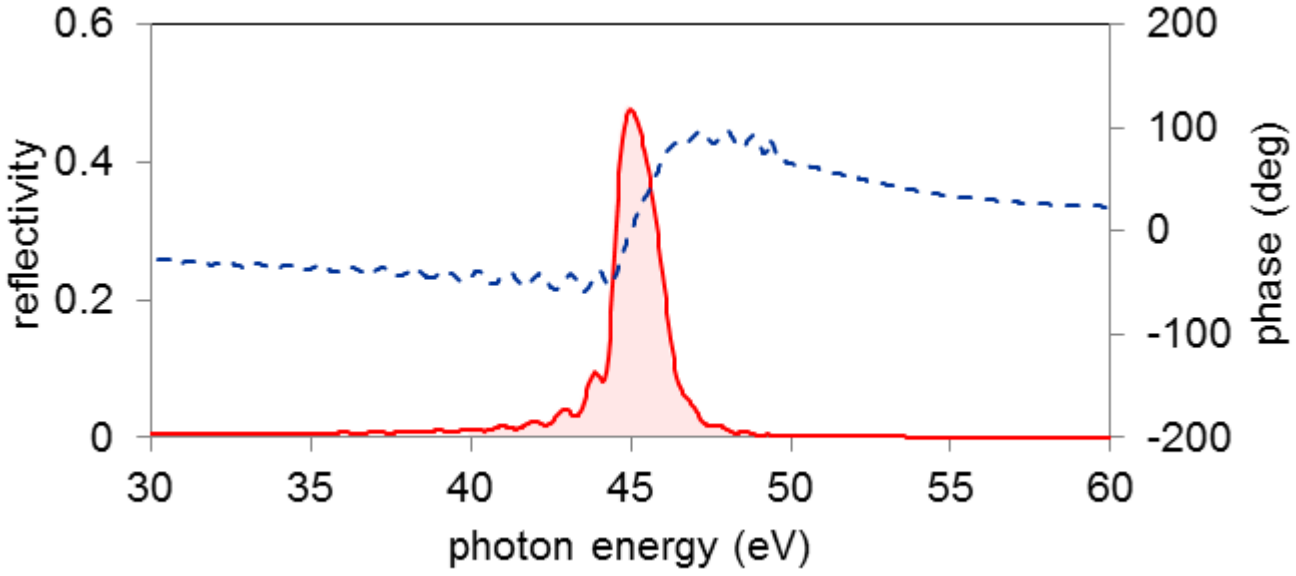
Design name	NRB-50-2.7
AOI	5 deg
polarization	s
peak energy	50 eV (24.8 nm)
peak reflectivity	33.5%
bandwidth (FWHM)	2.7 eV (1.3 nm)

NBR-48-1.3



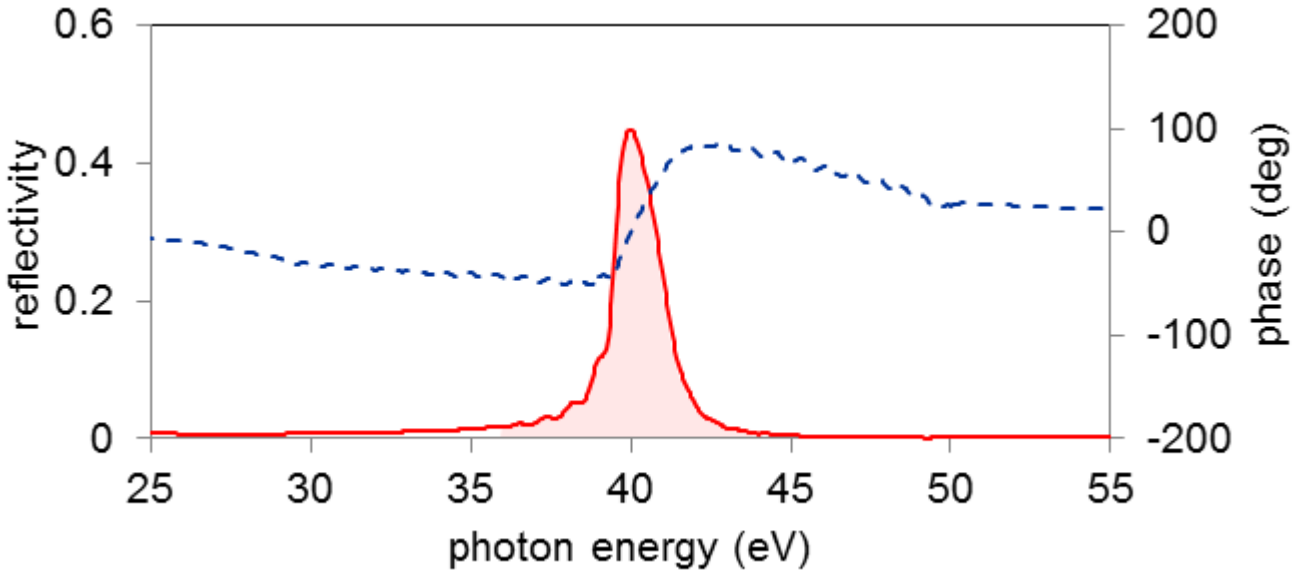
Design name	NNR-48-1.3
AOI	5 deg
polarization	s
peak energy	48 eV (25.8 nm)
peak reflectivity	49.2%
bandwidth (FWHM)	1.3 eV (0.7 nm)

NBR-45-1.5



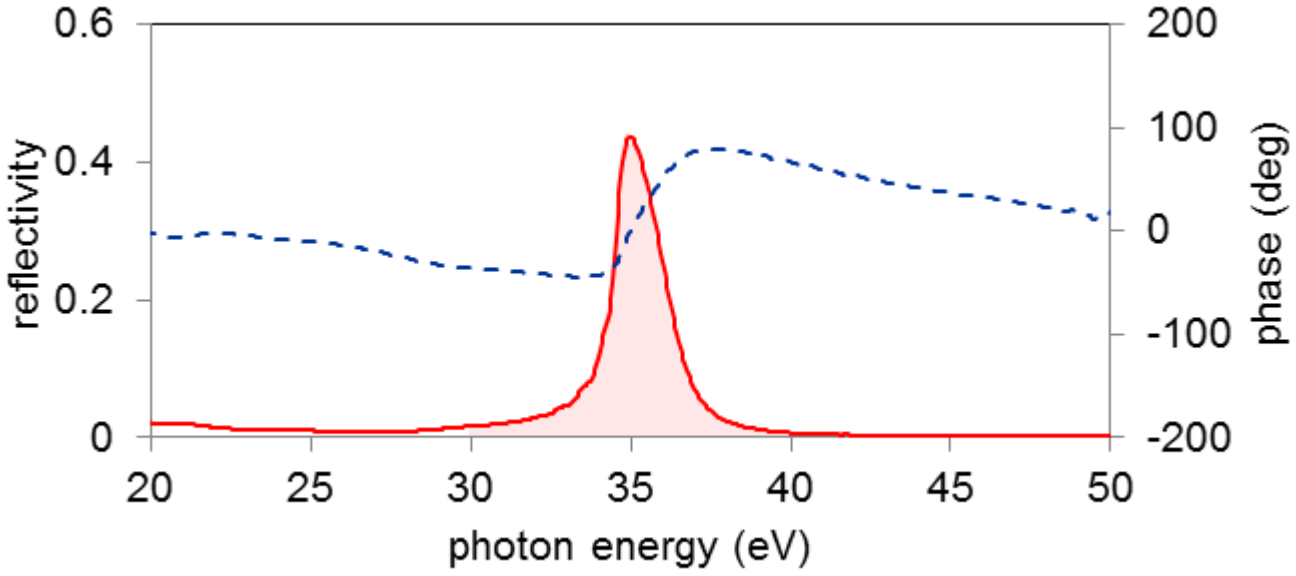
Design name	NRB-45-1.5
AOI	5 deg
polarization	s
peak energy	45 eV (27.6 nm)
peak reflectivity	47.6%
bandwidth (FWHM)	1.5 eV (0.9 nm)

NBR-40-1.5



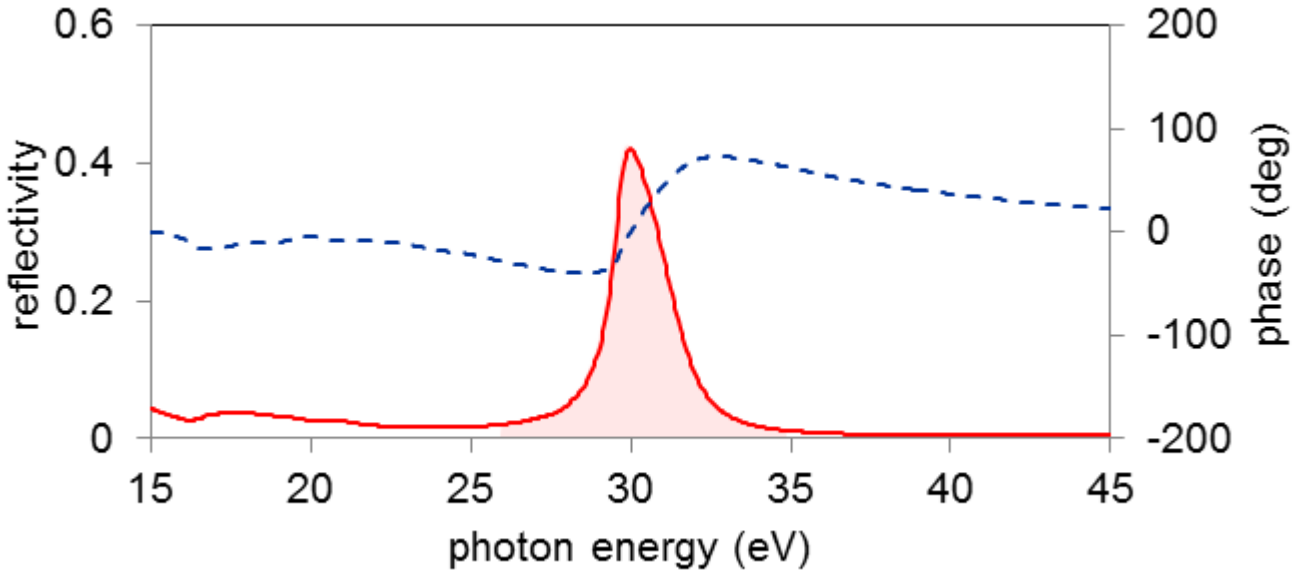
Design name	NNR-40-1.5
AOI	5 deg
polarization	s
peak energy	40 eV (31 nm)
peak reflectivity	44.8%
bandwidth (FWHM)	1.5 eV (1.1 nm)

NBR-35-1.6



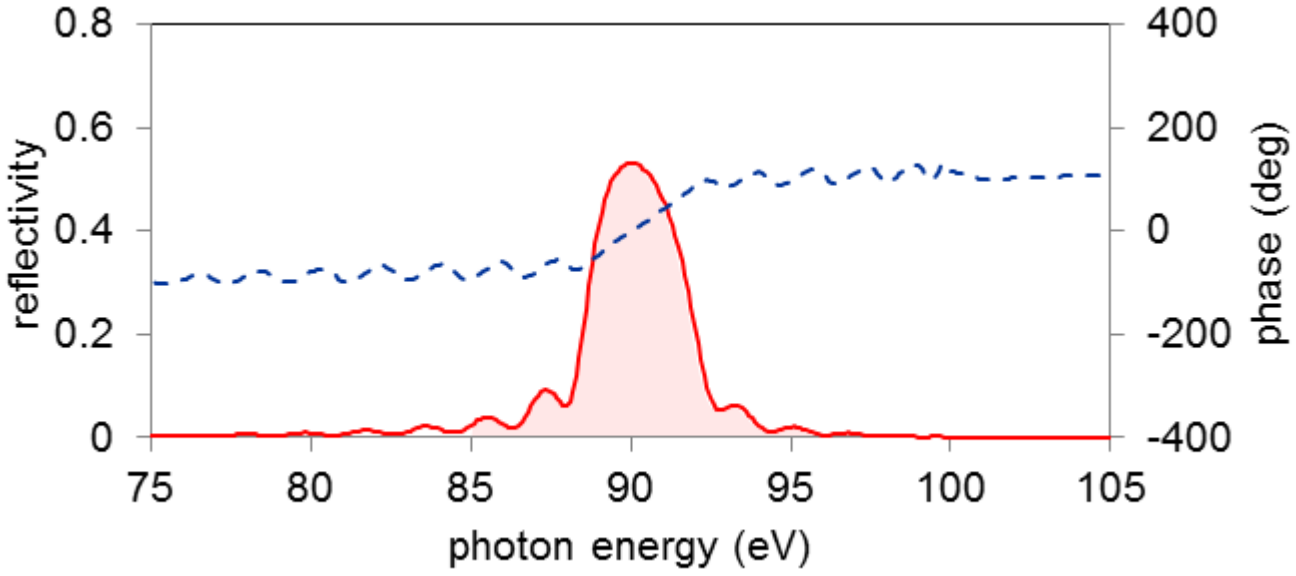
Design name	NRB-35-1.6
AOI	5 deg
polarization	s
peak energy	35 eV (35.4 nm)
peak reflectivity	43.7%
bandwidth (FWHM)	1.6 eV (1.6 nm)

NBR-30-1.9



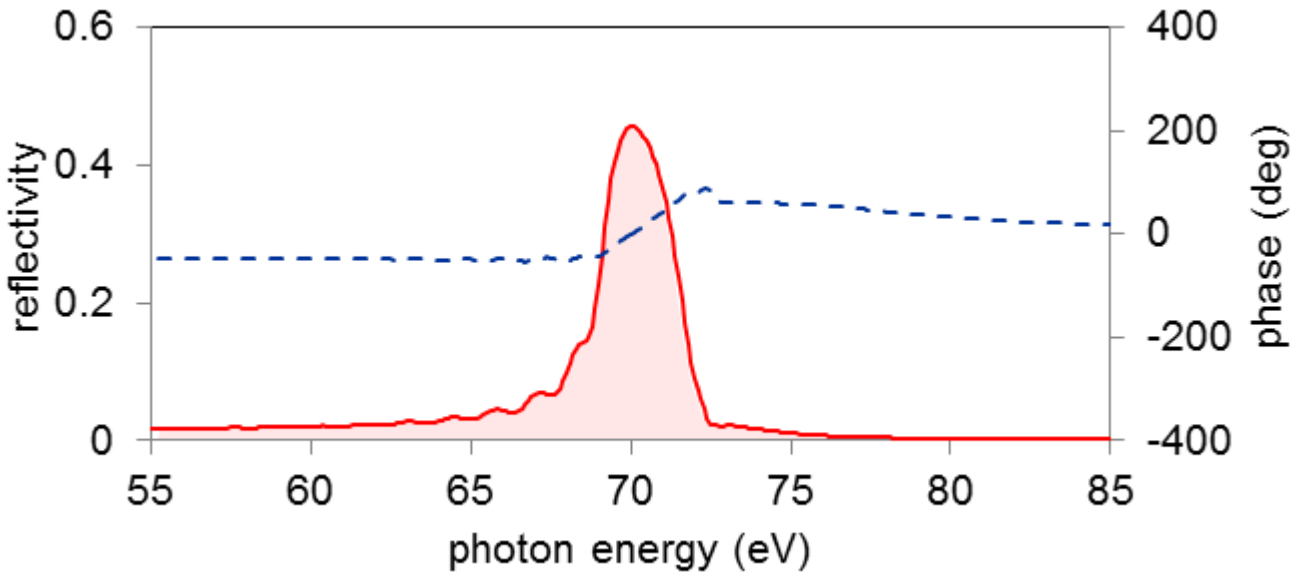
Design name	NNR-30-1.9
AOI	5 deg
polarization	s
peak energy	30 eV (41.3 nm)
peak reflectivity	42.0%
bandwidth (FWHM)	1.9 eV (2.6 nm)

NBR45-90-3.1



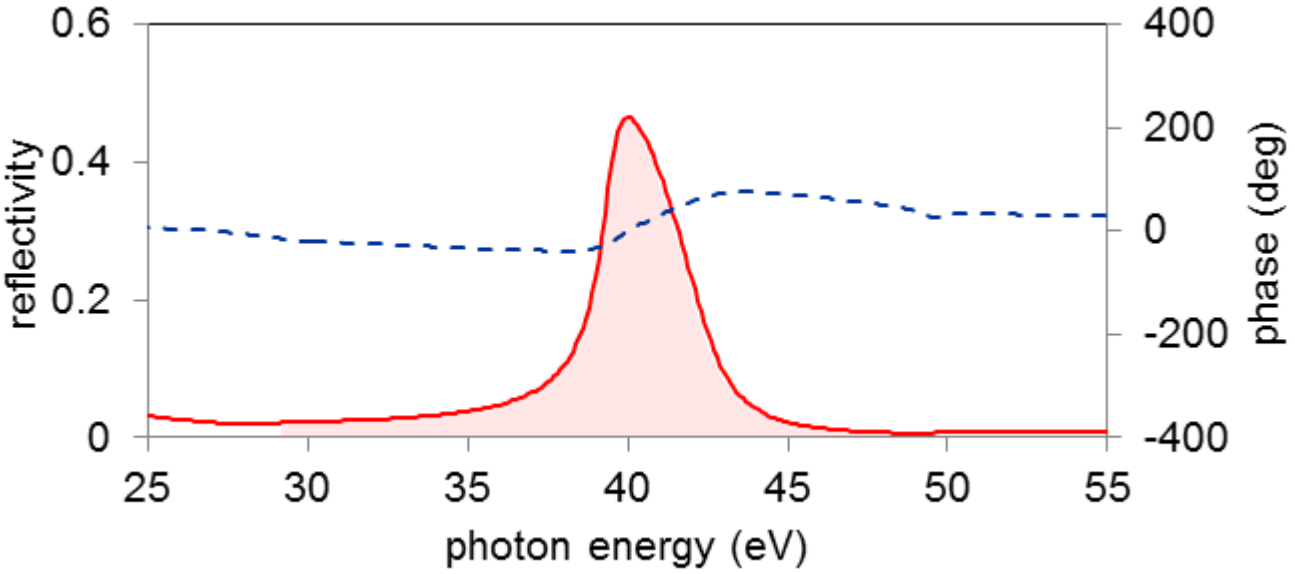
Design name	NRB45-90-3.1
AOI	45 deg
polarization	s
peak energy	90 eV (13.8 nm)
peak reflectivity	53.2%
bandwidth (FWHM)	3.1 eV (0.5 nm)

NBR45-70-2.6



Design name	NNR45-70-2.6
AOI	45 deg
polarization	s
peak energy	70 eV (17.7 nm)
peak reflectivity	45.6%
bandwidth (FWHM)	2.6 eV (0.7 nm)

NBR45-40-2.9

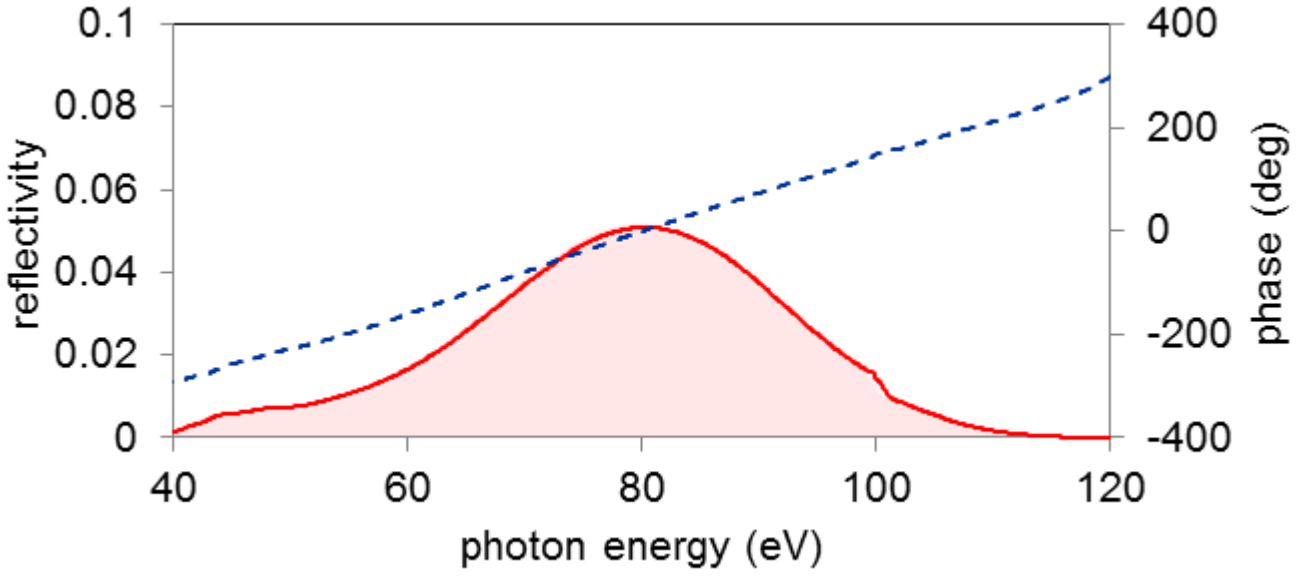


Design name	NRB45-40-2.9
AOI	45 deg
polarization	s
peak energy	40 eV (31 nm)
peak reflectivity	46.5%
bandwidth (FWHM)	2.9 eV (2.2 nm)

Broadband XUV MLMs are used as attosecond pulse focusing, attosecond pulsed measurements, astronomy, and plasma physics.

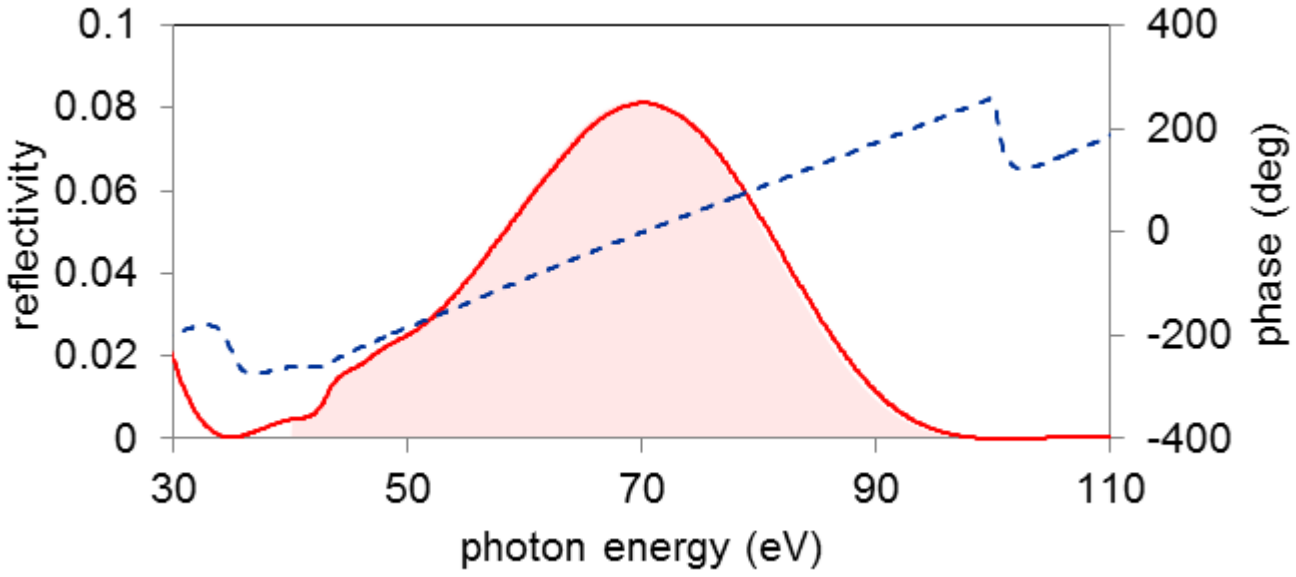
No	design name	AOI	pol.	peak energy	reflectivity	bandwidth (FWHM)
43	BBR-80-30	5 deg	s	80 eV (15.5 nm)	5.1%	30 eV (6.1 nm)
44	BBR-70-27	5 deg	s	70 eV (17.7 nm)	8.1%	27 eV (7.3 nm)
45	BBR-60-24	5 deg	s	60 eV (20.7 nm)	9.8%	24 eV (8.6 nm)
46	UBBR-55-39	5 deg	s	55 eV (22.5 nm)	6.8%	39 eV (16.3 nm)
47	UBBR-50-34	5 deg	s	50 eV (24.8 nm)	6.7%	34 eV (18.6 nm)

BBR-80-30



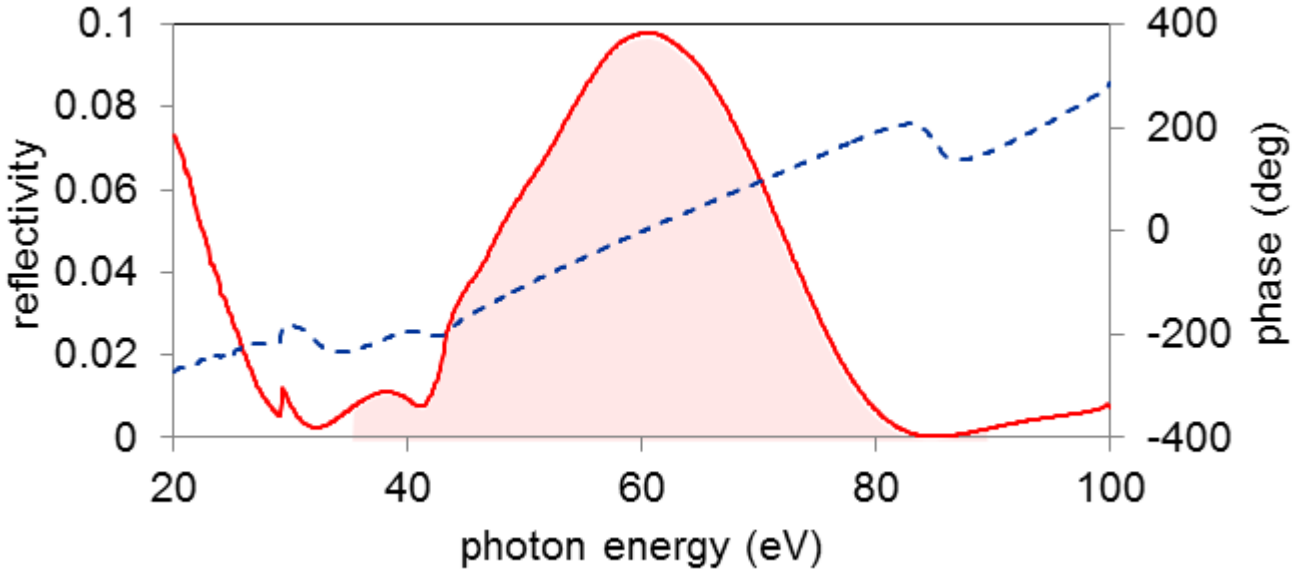
Design name	BBR-80-30
AOI	5 deg
polarization	s
peak energy	80 eV (15.5 nm)
peak reflectivity	5.1%
bandwidth (FWHM)	30 eV (6.1 nm)

BBR-70-27



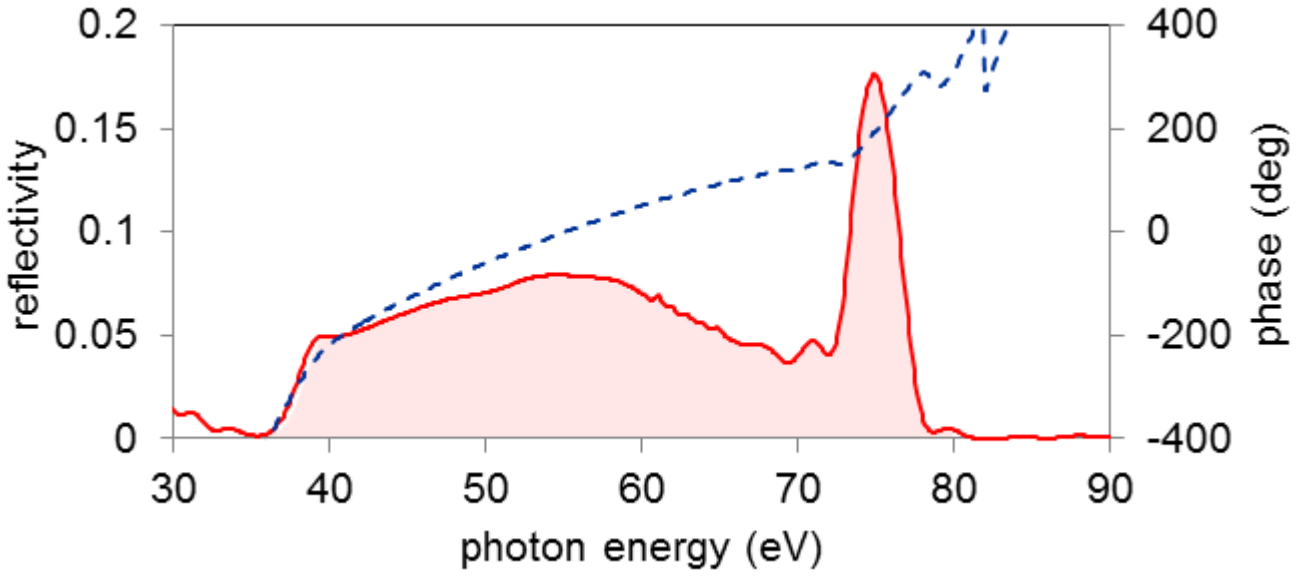
Design name	BBR-70-27
AOI	5 deg
polarization	s
peak energy	70 eV (17.7 nm)
peak reflectivity	8.1%
bandwidth (FWHM)	27 eV (7.3 nm)

BBR-60-24



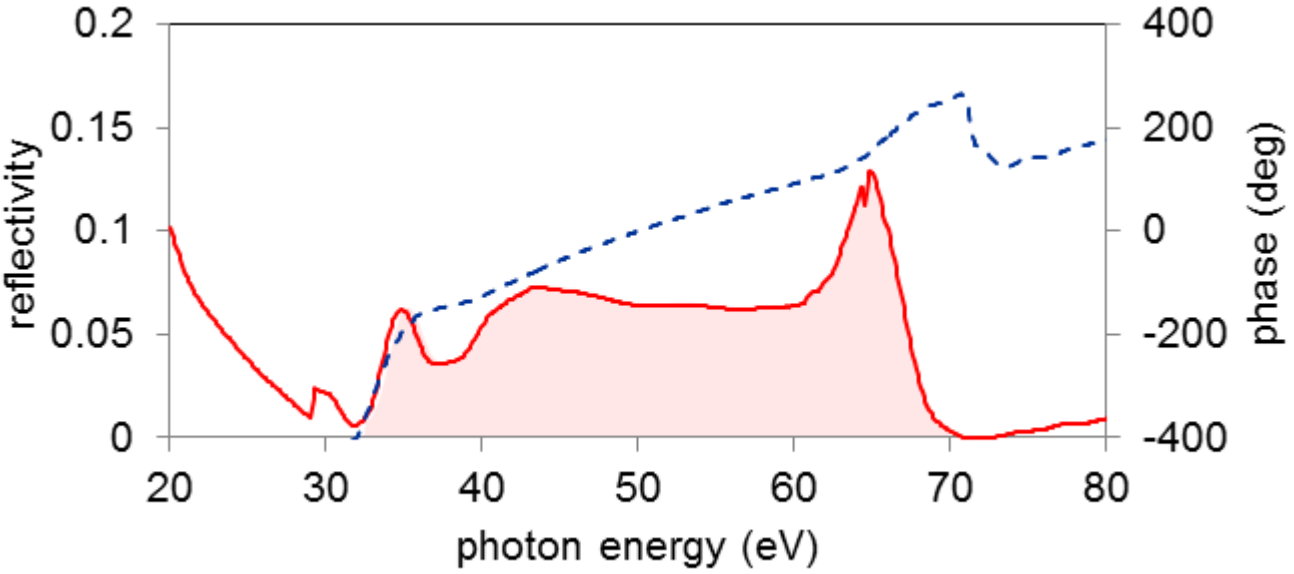
Design name	BBR-60-24
AOI	5 deg
polarization	s
peak energy	60 eV (20.7 nm)
peak reflectivity	9.8%
bandwidth (FWHM)	24 eV (8.6 nm)

UBBR-55-39



Design name	UBBR-55-39
AOI	5 deg
polarization	s
peak energy	55 eV (22.5 nm)
peak reflectivity	6.8%
bandwidth (FWHM)	39 eV (16.3 nm)

UBBR-50-34



Design name	UBBR-50-34
AOI	5 deg
polarization	s
peak energy	50 eV (24.8 nm)
peak reflectivity	6.7%
bandwidth (FWHM)	34 eV (18.6 nm)

Contact to: moreinfo@ml.ntt-at.co.jp

Substrate specifications	
Size (diameter or with and length)	
Surface figure (flat, concave, convex, …)	
Radius of curvature (or focal length)	

Multilayer specifications	
Central photon energy (or central wavelength)	
Bandwidth (FWHM) (eV or nm)	
Normal incident angle	
Materials (if required)	

Other requirements

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http://www.ntt-at.com/product/list_xuv_euv_x-ray_optics.html