

Supplementary Information for

Aluminum plasmonic waveguides co-integrated with Si_3N_4 photonics using CMOS processes

George Dabos^{1,*}, Athanasios Manolis¹, Dimitris Tsiokos¹, Dimitra Ketzaki¹, Evangelia Chatzianagnostou¹, Laurent Markey², Dmitrii Rusakov², Jean-Claude Weeber², Alain Dereux², Anna-Lena Giesecke³, Caroline Porschatis³, Thorsten Wahlbrink³, Bartos Chmielak³ and Nikos Pleros¹

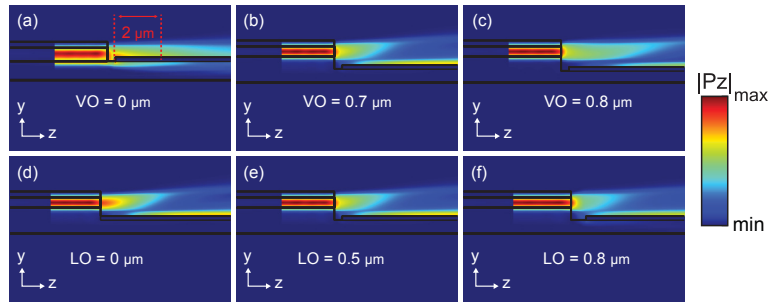
¹Department of Informatics, Center for Interdisciplinary Research and Innovation, Aristotle University of Thessaloniki, 10th Km Thessalonikis-Thermis Av., 57001, Greece

²Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR 6303 CNRS-Université de Bourgogne

³AMO GmbH, Advanced Microelectronic Center Aachen (AMICA), Otto-Blumenthal-Strasse 25, 52074, Aachen, Germany

*ntamposg@csd.auth.gr

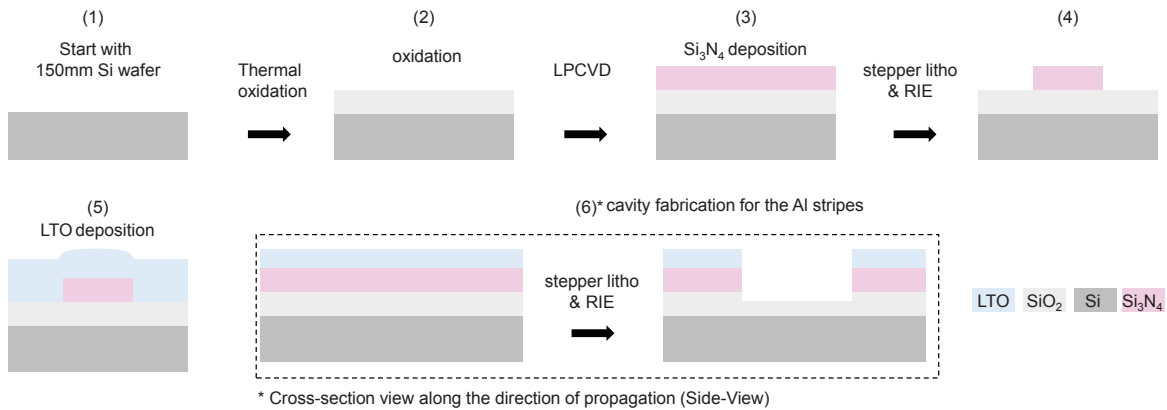
Design and simulation of the butt-coupled Al-to- Si_3N_4 interface



Supplementary Figure S1 Simulated norm of the Poynting vector $|P_z|$ along the direction of propagation for varied vertical (VO) and longitudinal (LO) offsets. (a-c) $|P_z|$ along the direction of propagation for vertical (VO) offsets of 0, 0.7 and 0.8 μm , respectively. (d-f) $|P_z|$ along the direction of propagation for longitudinal (LO) offsets of 0, 0.5 and 0.8 μm , respectively.

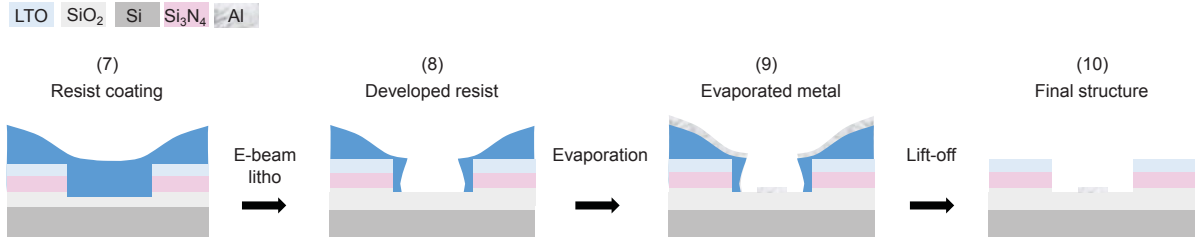
Samples fabrication

Fabrication of Si_3N_4 waveguides.



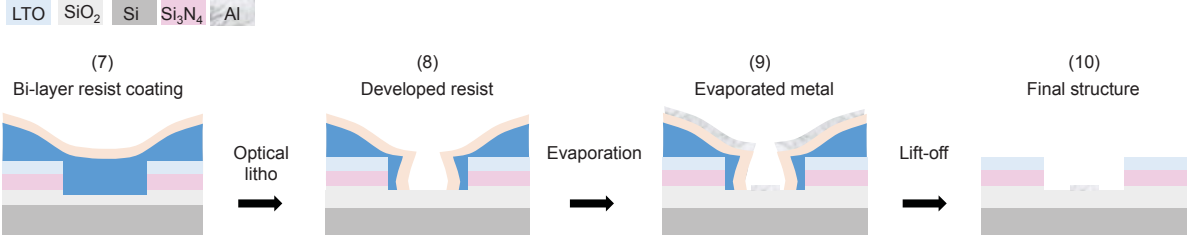
Supplementary Figure S2 Fabrication process flow of the Si_3N_4 waveguides and the cavity for Al stripes using optical projection lithography and an i-line stepper tool.

Fabrication of Al plasmonic waveguides using e-beam lithography.



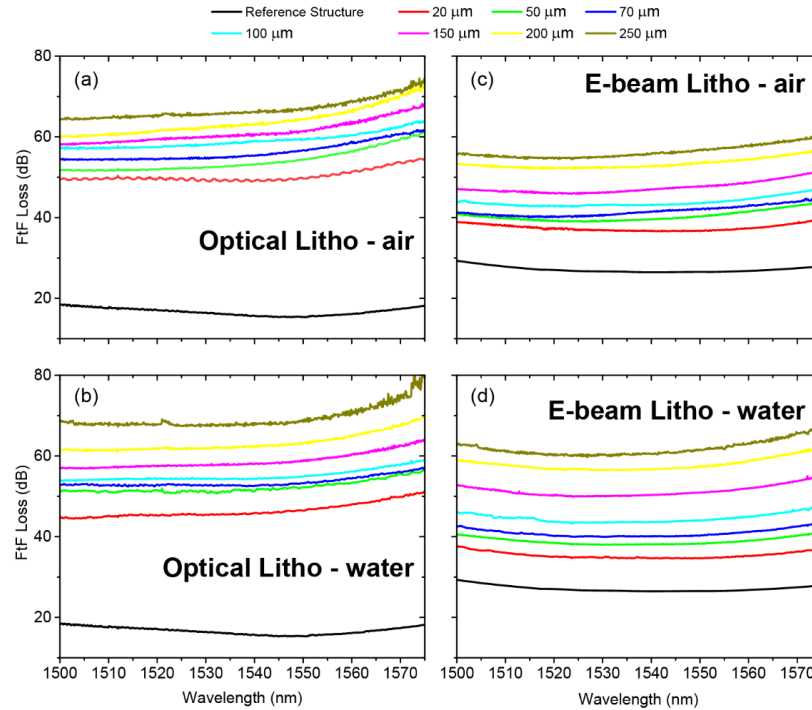
Supplementary Figure S3 Fabrication process flow for the Al plasmonic stipes using e-beam lithography and an evaporation speed of 0.1 nm/s.

Fabrication of Al plasmonic waveguides using optical lithography.



Supplementary Figure S4 Fabrication process flow of the Al plasmonic stipes using optical projection lithography and an in-line stepper tool. The evaporation speed of Al was 0.3 nm/s.

Optical characterization



Supplementary Figure S5 Fiber-to-fiber loss measurements for the tested structures and Al plasmonic waveguides with varied length that have been fabricated with (a,b) optical and (c,d) E-beam lithography, respectively.