Nanofabrication via Laser Interference Lithography

C.-H. Choi
Department of Mechanical Engineering, Stevens Institute of Technology, Hoboken, NJ 07030
cchoi@stevens.edu

The maskless laser interference lithography has widely been used for the patterning of periodic nanostructures, having the advantages of a large coverage area and simple system configuration.[1,2] It has allowed the application of nanostructures to many scientific and engineering disciplines beyond electronics/optics/photonics.[3,4] In this invited talk, the versatility of the laser interference lithography for the various routes to novel nanofabrication processes will be presented. It includes the fabrication of the dense array of tall nanostructures with sidewall profile and tip sharpness control,[5,6] the pattern transfer of metallic nanostructures onto both hard and soft substrates,[7,8] the application of the free-standing holographic nanopatterns for lift-off and stencil lithography to design hierarchical nanostructures,[9-11] the nanopatterning of 2D materials,[12] the synthesis of nanomaterials and nanostructures (including nanofibers, nanowires, nanotubes, nanochannels, nanoshells, and nanocavities),[13-19] and the fabrication of 3D nanostructures.[20]

---

[1] I. Wathuthanthri, W. Mao, C.-H. Choi, ***Opt. Lett.*** 36, 1593-1595 (2011).
[2] W. Mao, I. Wathuthanthri, C.-H. Choi, ***Opt. Lett.*** 36, 3176-3178 (2011).
[3] C.-H. Choi, U. Ulmanella, J. Kim, C.-M. Ho, C.-J. Kim, ***Phys. Fluids*** 18, 087105 (2006).
[4] C.-H. Choi, S. H. Hagvall, B. M. Wu, J. C. Y. Dunn, R. E. Beygui, C.-J. Kim, ***Biomaterials*** 28, 1672-1679 (2007).
[5] C.-H. Choi, C.-J. Kim, ***Nanotechnol.*** 17, 5326-5333 (2006).
[6] I. Wathuthanthri, Y. Liu, K. Du, W. Xu, C.-H. Choi, ***Adv. Funct. Mater.*** 23, 608-618 (2013).
[7] K. Du, I. Wathuthanthri, W. Mao, W. Xu, C.-H. Choi, ***Nanotechnol.*** 22, 285306 (2011).
[8] K. Du, I. Wathuthanthri, Y. Liu, W. Xu, C.-H. Choi, ***ACS Appl. Mater. Interfaces*** 4, 5505-5514 (2012).
[9] K. Du, Y. Liu, I. Wathuthanthri, C.-H. Choi, ***J. Vac. Sci. Technol. B*** 30, 06FF04 (2012).
[10] K. Du, Y. Liu, I. Wathuthanthri, C.-H. Choi, ***J. Vac. Sci. Technol. B*** 31, 06FF04 (2013).
[11] K. Du, J. Ding, I. Wathuthanthri, C.-H. Choi, ***Nanotechnol.*** 28, 465303 (2017).
[12] J. Ding, K. Du, I. Wathuthanthri, C.-H. Choi, F. Fisher, E.-H. Yang, ***J. Vac. Sci. Technol. B*** 32, 06FF01 (2014).
[13] A.A. El Mel, E. Gautron, C.-H. Choi, B. Angleraud, A. Granier, P.Y. Tessier, ***Nanotechnol.*** 21, 435603 (2010).
[14] A.A. El Mel, M. Buffiere, F. Massuyeau, E. Gautron, J. Wery, E. Faulques, N. Barreau, P.Y. Tessier, W. Xu, C.-H. Choi, ***Chem. Vap. Depos.*** 17, 337-341 (2011).
[15] A.A. El Mel, A. Achour, W. Xu, C.-H. Choi, E. Gautron, B. Angleraud, A. Granier, L. Le Brizoual, M. A. Djouadi, P.Y. Tessier, ***Nanotechnol.*** 22, 435302 (2011).
[16] A.A. El Mel, E. Gautron, B. Angleraud, A. Granier, W. Xu, C.-H. Choi, K. J. Briston, B. J. Inkson, P.Y. Tessier, ***Nanotechnol.*** 23, 275603 (2012).
[17] A.-A. El Mel, L. Molina-Luna, M. Buffière, P.-Y. Tessier, K. Du, C.-H. Choi, H.-J. Kleebe, S. Konstantinidis, C. Bittencourt, R. Snyders, ***ACS Nano*** 8, 1854-1861 (2014).
[18] D. Thiry, L. Molina-Luna, E. Gautron, N. Stephan, A. Chauvin, K. Du, J. Ding, C.-H. Choi, P. Y. Tessier, A. A. El Mel, ***Chem. Mater.*** 27, 6374-6384 (2015).
[19] A.-A. El Mel, P.-Y. Tessier, M. Buffiere, E. Gautron, J. Ding, K. Du, C.-H. Choi, S. Konstantinidis, R. Snyders, C. Bittencourt, L. Molina-Luna, ***Small*** 12, 2885-2892 (2016).
[20] Y. Liu, K. Du, I. Wathuthanthri, W. Xu, C.-H. Choi, ***Adv. Funct. Mater.*** 30, 2004129 (2020).