

approaches and allows new functionalities that would be difficult to implement with conventional single-layer designs. Using this engineering framework, we create a stretchable human-machine interface testbed that is based on a four-layer design and offers eight-channel sensing and Bluetooth data communication capabilities (Figure 1.61).

## References

- 1 Yoder, M.A., Yan, Z., Han, M. et al. (2018). Semiconductor nanomembrane materials for high-performance soft electronic devices. *Journal of the American Chemical Society* 140 (29): 9001–9019. <https://doi.org/10.1021/jacs.8b04225>.
- 2 Song, J., Jiang, H., Choi, W.M. et al. (2008). An analytical study of two-dimensional buckling of thin films on compliant substrates. *Journal of Applied Physics* 103 (1): 2548. <https://doi.org/10.1063/1.2828050>.
- 3 Rogers, J.A., Lagally, M.G., and Nuzzo, R.G. (2011). Synthesis, assembly and applications of semiconductor nanomembranes. *Nature* 477 (7362): 45–53. <https://doi.org/10.1038/nature10381>.
- 4 Sun, Y. and Rogers, J.A. (2007). Inorganic semiconductors for flexible electronics. *Advanced Materials* 19 (15): 1897–1916. <https://doi.org/10.1002/adma.200602223>.
- 5 Kim, D.-H., Ahn, J.-H., Choi, W.M. et al. (2008). Stretchable and foldable silicon integrated circuits. *Science* 320 (5875): 507–511. <https://doi.org/10.1126/science.1154367>.
- 6 Baca, A.J., Ahn, J.-H., Sun, Y. et al. (2008). Semiconductor wires and ribbons for high- performance flexible electronics. *Angewandte Chemie International Edition* 47 (30): 5524–5542. <https://doi.org/10.1002/anie.200703238>.
- 7 Xue, Z., Song, H., Rogers, J.A. et al. (2020). Mechanically-guided structural designs in stretchable inorganic electronics. *Advanced Materials* 32 (15): 1902254. <https://doi.org/10.1002/adma.201902254>.
- 8 Khang, D.-Y., Rogers, J.A., and Lee, H.H. (2009). Mechanical buckling: mechanics, metrology, and stretchable electronics. *Advanced Functional Materials* 19 (10): 1526–1536. <https://doi.org/10.1002/adfm.200801065>.
- 9 Yang, S., Khare, K., and Lin, P.-C. (2010). Harnessing surface wrinkle patterns in soft matter. *Advanced Functional Materials* 20 (16): 2550–2564. <https://doi.org/10.1002/adfm.201000034>.
- 10 Yu, C., Wang, Z., Yu, H. et al. (2009). A stretchable temperature sensor based on elastically buckled thin film devices on elastomeric substrates. *Applied Physics Letters* 95 (14): 141912. <https://doi.org/10.1063/1.3243692>.
- 11 Yu, C. and Jiang, H. (2010). Forming wrinkled stiff films on polymeric substrates at room temperature for stretchable interconnects applications. *Thin Solid Films* 519 (2): 818–822. <https://doi.org/10.1016/j.tsf.2010.08.106>.
- 12 Zhang, Q. and Yin, J. (2018). Spontaneous buckling-driven periodic delamination of thin films on soft substrates under large compression. *Journal of the*

- Mechanics and Physics of Solids* 118: 40–57. <https://doi.org/10.1016/j.jmps.2018.05.009>.
- 13 Ma, Y., Xue, Y., Jang, K.-I. et al. (2016). Wrinkling of a stiff thin film bonded to a pre-strained, compliant substrate with finite thickness. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences* 472 (2192): 20160339. <https://doi.org/10.1098/rspa.2016.0339>.
  - 14 Yan, Z.G., Wang, B.L., and Wang, K.F. (2019). Stretchability and compressibility of a novel layout design for flexible electronics based on bended wrinkle geometries. *Composites Part B: Engineering* 166: 65–73. <https://doi.org/10.1016/j.compositesb.2018.11.123>.
  - 15 Jiang, H., Khang, D.-Y., Song, J. et al. (2007). Finite deformation mechanics in buckled thin films on compliant supports. *Proceedings of the National Academy of Sciences* 104 (40): 15607–15612. <https://doi.org/10.1073/pnas.0702927104>.
  - 16 Cheng, H., Zhang, Y., Hwang, K.-C. et al. (2014). Buckling of a stiff thin film on a pre-strained bi-layer substrate. *International Journal of Solids and Structures* 51 (18): 3113–3118. <https://doi.org/10.1016/j.ijsolstr.2014.05.012>.
  - 17 Cheng, H. and Song, J. (2014). A simply analytic study of buckled thin films on compliant substrates. *Journal of Applied Mechanics* 81 (2): 024501. <https://doi.org/10.1115/1.4025306>.
  - 18 Song, J., Jiang, H., Liu, Z.J. et al. (2008). Buckling of a stiff thin film on a compliant substrate in large deformation. *International Journal of Solids and Structures* 45 (10): 3107–3121. <https://doi.org/10.1016/j.ijsolstr.2008.01.023>.
  - 19 Jiang, H., Sun, Y., Rogers, J.A. et al. (2007). Mechanics of precisely controlled thin film buckling on elastomeric substrate. *Applied Physics Letters* 90 (13): 133119. <https://doi.org/10.1063/1.2719027>.
  - 20 Jiang, H., Khang, D.-Y., Fei, H. et al. (2008). Finite width effect of thin-films buckling on compliant substrate: experimental and theoretical studies. *Journal of the Mechanics and Physics of Solids* 56 (8): 2585–2598. <https://doi.org/10.1016/j.jmps.2008.03.005>.
  - 21 Chen, C., Tao, W., Liu, Z.J. et al. (2011). Controlled buckling of thin film on elastomeric substrate in large deformation. *Theoretical and Applied Mechanics Letters* 1 (2): 021001. <https://doi.org/10.1063/2.1102101>.
  - 22 Song, J., Huang, Y., Xiao, J. et al. (2009). Mechanics of noncoplanar mesh design for stretchable electronic circuits. *Journal of Applied Physics* 105 (12): 123516. <https://doi.org/10.1063/1.3148245>.
  - 23 Li, R., Li, M., Su, Y. et al. (2013). An analytical mechanics model for the island-bridge structure of stretchable electronics. *Soft Matter* 9 (35): 8476. <https://doi.org/10.1039/c3sm51476e>.
  - 24 Ko, H.C., Shin, G., Wang, S. et al. (2009). Curvilinear electronics formed using silicon membrane circuits and elastomeric transfer element. *Small* 5 (23): 2703–2709. <https://doi.org/10.1002/sml.200900934>.
  - 25 Wang, A., Avila, R., and Ma, Y. (2017). Mechanics design for buckling of thin ribbons on an elastomeric substrate without material failure. *Journal of Applied Mechanics* 84 (9): 094501. <https://doi.org/10.1115/1.4037149>.

- 26 Wang, B. and Wang, S. (2016). Adhesion-governed buckling of thin-film electronics on soft tissues. *Theoretical and Applied Mechanics Letters* 6 (1): 6–10. <https://doi.org/10.1016/j.taml.2015.11.010>.
- 27 Wang, S., Xiao, J., Song, J. et al. (2010). Mechanics of curvilinear electronics. *Soft Matter* 6 (22): 5757. <https://doi.org/10.1039/c0sm00579g>.
- 28 Yang, X.-D., Yang, S., Qian, Y.-J. et al. (2016). Modal analysis of the gyroscopic continua: comparison of continuous and discretized models. *Journal of Applied Mechanics* 83 (8): 084502. <https://doi.org/10.1115/1.4033752>.
- 29 Widlund, T., Yang, S., Hsu, Y.-Y. et al. (2014). Stretchability and compliance of freestanding serpentine-shaped ribbons. *International Journal of Solids and Structures* 51 (23–24): 4026–4037. <https://doi.org/10.1016/j.ijsolstr.2014.07.025>.
- 30 Son, D., Koo, J.H., Song, J.-K. et al. (2015). Stretchable carbon nanotube charge-trap floating-gate memory and logic devices for wearable electronics. *ACS Nano* 9 (5): 5585–5593. <https://doi.org/10.1021/acsnano.5b01848>.
- 31 Yang, S., Ng, E., and Lu, N. (2015). Indium Tin Oxide (ITO) serpentine ribbons on soft substrates stretched beyond 100%. *Extreme Mechanics Letters* 2: 37–45. <https://doi.org/10.1016/j.eml.2015.01.010>.
- 32 Fan, Z., Zhang, Y., Ma, Q. et al. (2016). A finite deformation model of planar serpentine interconnects for stretchable electronics. *International Journal of Solids and Structures* 91: 46–54. <https://doi.org/10.1016/j.ijsolstr.2016.04.030>.
- 33 Xiao, L., Zhu, C., Xiong, W. et al. (2018). The conformal design of an island-bridge structure on a nondevelopable surface for stretchable electronics. *Micromachines* 9 (8): 392. <https://doi.org/10.3390/mi9080392>.
- 34 Xu, L., Gutbrod, S.R., Bonifas, A.P. et al. (2014). 3D multifunctional integumentary membranes for spatiotemporal cardiac measurements and stimulation across the entire epicardium. *Nature Communications* 5 (1): 3329. <https://doi.org/10.1038/ncomms4329>.
- 35 Zhang, Y., Xu, S., Fu, H. et al. (2013). Buckling in serpentine microstructures and applications in elastomer-supported ultra-stretchable electronics with high areal coverage. *Soft Matter* 9 (33): 8062. <https://doi.org/10.1039/c3sm51360b>.
- 36 Zhang, Y., Wang, S., Li, X. et al. (2014). Experimental and theoretical studies of serpentine microstructures bonded to prestrained elastomers for stretchable electronics. *Advanced Functional Materials* 24 (14): 2028–2037. <https://doi.org/10.1002/adfm.201302957>.
- 37 Su, Y., Ping, X., Yu, K.J. et al. (2017). In-Plane deformation mechanics for highly stretchable electronics. *Advanced Materials* 29 (8): 1604989. <https://doi.org/10.1002/adma.201604989>.
- 38 Pan, T., Pharr, M., Ma, Y. et al. (2017). Experimental and theoretical studies of serpentine interconnects on ultrathin elastomers for stretchable electronics. *Advanced Functional Materials* 27 (37): 1702589. <https://doi.org/10.1002/adfm.201702589>.
- 39 Lv, C., Yu, H., and Jiang, H. (2014). Archimedean spiral design for extremely stretchable interconnects. *Extreme Mechanics Letters* 1: 29–34.

- 40 Yuan, X. and Wang, Y. (2023). Nonlinear stretching mechanics of planar Archimedean-spiral interconnects for flexible electronics. *Thin-Walled Structures* 185: 110568.
- 41 Huang, K., Dinyari, R., Lanzara, G. et al. (2007). An approach to cost-effective, robust, large-area electronics using monolithic silicon. 2007 IEEE International Electron Devices Meeting. IEEE, 2007, pp. 217-220.
- 42 Sung, W.L., Chen, C., Huang, K. et al. (2015). Development of a large-area chip network with multidevice integration using a stretchable electroplated copper spring. *Journal of Micromechanics and Microengineering* 26 (2): 025003.
- 43 Alcheikh, N., Shaikh, S.F., and Hussain, M. (2018). Ultra-stretchable Archimedean interconnects for stretchable electronics. *Extreme Mechanics Letters* 24: 6–13.
- 44 Rojas, J.P., Arevalo, A., Foulds, I.G. et al. (2014). Design and characterization of ultra-stretchable monolithic silicon fabric. *Applied Physics Letters* 105 (15).
- 45 Rehman, M.U. and Rojas, J.P. (2017). Optimization of compound serpentine–spiral structure for ultra-stretchable electronics. *Extreme Mechanics Letters* 15: 44–50.
- 46 Xu, S., Yan, Z., Jang, K.I. et al. (2015). Assembly of micro/nanomaterials into complex, three-dimensional architectures by compressive buckling. *Science* 347 (6218): 154–159.
- 47 Yan, Z., Han, M., Yang, Y. et al. (2017). Deterministic assembly of 3D mesostructures in advanced materials via compressive buckling: a short review of recent progress. *Extreme Mechanics Letters* 11: 96–104.
- 48 Liu, Y., Yan, Z., Lin, Q. et al. (2016). Guided formation of 3D helical mesostructures by mechanical buckling: analytical modeling and experimental validation. *Advanced Functional Materials* 26 (17): 2909–2918.
- 49 Li, K., Cheng, X., Zhu, F. et al. (2019). A generic soft encapsulation strategy for stretchable electronics. *Advanced Functional Materials*.
- 50 Viventi, J., Kim, D.H., Vigeland, L. et al. (2011). Flexible, foldable, actively multiplexed, high-density electrode array for mapping brain activity in vivo. *Nature Neuroscience* 14 (12): 1599–1605.
- 51 Jang, K., Li, K., Chung, H. et al. (2017). Self-assembled three dimensional network designs for soft electronics. *Nature Communications* 8: 15849.
- 52 Fan, J.A., Yeo, W.H., Su, Y. et al. (2014). Fractal design concepts for stretchable electronics. *Nature Communications* 5 (1): 3266.
- 53 Xu, S., Zhang, Y., Cho, J. et al. (2013). Stretchable batteries with self-similar serpentine interconnects and integrated wireless recharging systems. *Nature Communications* 4 (1): 1543.
- 54 Zhang, Y., Fu, H., Xu, S. et al. (2014). A hierarchical computational model for stretchable interconnects with fractal-inspired designs. *Journal of the Mechanics and Physics of Solids* 72: 115–130.
- 55 Zhang, Y., Fu, H., Su, Y. et al. (2013). Mechanics of ultra-stretchable self-similar serpentine interconnects. *Acta Materialia* 61 (20): 7816–7827.

- 56 Ma, Q. and Zhang, Y. (2016). Mechanics of fractal-inspired horseshoe microstructures for applications in stretchable electronics. *Journal of Applied Mechanics* 83 (11): 111008.
- 57 Xu, L., Gutbrod, S.R., Ma, Y. et al. (2015). Materials and fractal designs for 3D multifunctional integumentary membranes with capabilities in cardiac electrotherapy. *Advanced Materials* 27 (10): 1731–1737.
- 58 Norton, J.J.S., Lee, D.S., Lee, J.W. et al. (2015). Soft, curved electrode systems capable of integration on the auricle as a persistent brain–computer interface. *Proceedings of the National Academy of Sciences* 112 (13): 3920–3925.
- 59 Kim, J., Lee, M., Shim, H.J. et al. (2014). Stretchable silicon nanoribbon electronics for skin prosthesis. *Nature Communications* 5 (1): 5747.
- 60 Hattori, Y., Falgout, L., Lee, W. et al. (2014). Multifunctional skin-like electronics for quantitative, clinical monitoring of cutaneous wound healing. *Advanced Healthcare Materials* 3 (10): 1597–1607.
- 61 Liu, Z., Cheng, H., and Wu, J. (2014). Mechanics of solar module on structured substrates. *Journal of Applied Mechanics* 10 (1115/1): 4026472.
- 62 Lee, J., Wu, J., Ryu, J.H. et al. (2012). Stretchable semiconductor technologies with high areal coverages and strain-limiting behavior: demonstration in high-efficiency dual-junction GaInP/GaAs photovoltaics. *Small* 8: 1851–1856. <https://doi.org/10.1002/sml.201102437>.
- 63 Cantarella, G., Costanza, V., Ferrero, A. et al. (2018). Design of engineered elastomeric substrate for stretchable active devices and sensors. *Advanced Functional Materials* <https://doi.org/10.1002/adfm.201705132>.
- 64 Zhao, Q., Liang, Z., Lu, B. et al. (2018). Toothed Substrate Design to Improve Stretchability of Serpentine Interconnect for Stretchable Electronics. *Advanced Materials Technologies* 3: <https://doi.org/10.1002/admt.201800169>.
- 65 Yu, Q., Chen, F., Li, M., and Cheng, H. (2017). Buckling analysis of stiff thin films suspended on a substrate with tripod surface relief structure. *Applied Physics Letters* 111: <https://doi.org/10.1063/1.5003792>.
- 66 Qi, D., Liu, Z., Yu, M. et al. (2015). Highly stretchable gold nanobelts with sinusoidal structures for recording electrocorticograms. *Advanced Materials* 27: 3145–3151. <https://doi.org/10.1002/adma.201405807>.
- 67 Lee, Y.K., Jang, K., Ma, Y. et al. (2017). Chemical sensing systems that utilize soft electronics on thin elastomeric substrates with open cellular designs. *Advanced Functional Materials* 27: <https://doi.org/10.1002/adfm.201605476>.
- 68 Chen, H., Zhu, F., Jang, K.-I. et al. (2018). The equivalent medium of cellular substrate under large stretching, with applications to stretchable electronics. *Journal of the Mechanics and Physics of Solids* 120: 199–207. <https://doi.org/10.1016/j.jmps.2017.11.002>.
- 69 Zhu, F., Xiao, H., Xue, Y. et al. (2018). Anisotropic mechanics of cellular substrate under finite deformation. *Journal of Applied Mechanics* 85: <https://doi.org/10.1115/1.4039964>.
- 70 Jang, K.-I., Chung, H.U., Xu, S. et al. (2015). Soft network composite materials with deterministic and bio-inspired designs. *Nature Communications* <https://doi.org/10.1038/ncomms7566>.

- 71 Liu, J. and Zhang, Y. (2017). Soft network materials with isotropic negative Poisson's ratios over large strains. *Soft Matter* 14: 693–703. <https://doi.org/10.1039/c7sm02052j>.
- 72 Liu, J. and Zhang, Y. (2018). A mechanics model of soft network materials with periodic lattices of arbitrarily shaped filamentary microstructures for tunable Poisson's ratios. *Journal of Applied Mechanics* 85: <https://doi.org/10.1115/1.4039374>.
- 73 Petruczok, C.D. and Gleason, K.K. (2012). Initiated chemical vapor deposition-based method for patterning polymer and metal microstructures on curved substrates. *Advanced Materials* 24: 6445–6450. <https://doi.org/10.1002/adma.201201975>.
- 74 Shin, G., Jung, I., Malyarchuk, V. et al. (2010). Micromechanics and advanced designs for curved photodetector arrays in hemispherical electronic-eye cameras. *Small* 6: 851–856. <https://doi.org/10.1002/sml.200901350>.
- 75 Song, Y.M., Xie, Y., Malyarchuk, V. et al. (2013). Digital cameras with designs inspired by the arthropod eye. *Nature* 497: 95–99. <https://doi.org/10.1038/nature12083>.
- 76 Jung, I., Xiao, J., Malyarchuk, V. et al. (2011). Dynamically tunable hemispherical electronic eye camera system with adjustable zoom capability. *Proceedings of the National Academy of Sciences* 108: 1788–1793. <https://doi.org/10.1073/pnas.1015440108>.
- 77 Su, Y., Liu, Z., Wang, S. et al. (2014). Mechanics of stretchable electronics on balloon catheter under extreme deformation. *International Journal of Solids and Structures* 51: 1555–1561. <https://doi.org/10.1016/j.ijsolstr.2014.01.008>.
- 78 Kim, D.-H., Lu, N., Ghaffari, R. et al. (2011). Materials for multifunctional balloon catheters with capabilities in cardiac electrophysiological mapping and ablation therapy. *Nature Materials* 10: 316–323. <https://doi.org/10.1038/nmat2971>.
- 79 Zhao, Z., Kuang, X., Wu, J. et al. (2018). 3D printing of complex origami assemblies for reconfigurable structures. *Soft Matter* 14 (39): 8051–8059.
- 80 Ning, X., Wang, X., Zhang, Y. et al. (2018). Assembly of advanced materials into 3D functional structures by methods inspired by origami and kirigami: a review. *Advanced Materials Interfaces* 5 (13): 1800284.
- 81 Liu, Z., Cui, A., Li, J. et al. (2019). Folding 2D structures into 3D configurations at the micro/nanoscale: principles, techniques, and applications. *Advanced Materials* 31 (4): 1802211.
- 82 Miskin, M.Z., Dorsey, K.J., Bircan, B. et al. (2018). Graphene-based bimorphs for micron-sized, autonomous origami machines. *Proceedings of the National Academy of Sciences* 115 (3): 466–470.
- 83 Yang, C., Huang, Y., Cheng, H. et al. (2019). Rollable, stretchable, and reconfigurable graphene hygroelectric generators. *Advanced Materials* 31 (2): 1805705.
- 84 Tang, R., Huang, H., Tu, H. et al. (2014). Origami-enabled deformable silicon solar cells. *Applied Physics Letters* 104 (8): 083501.
- 85 Rojas, J.P., Conchouso, D., Arevalo, A. et al. (2017). Paper-based origami flexible and foldable thermoelectric nanogenerator. *Nano Energy* 31: 296–301.

- 86 Kim, M., Park, J., Ji, S. et al. (2016). Fully-integrated, bezel-less transistor arrays using reversibly foldable interconnects and stretchable origami substrates. *Nanoscale* 8 (18): 9504–9510.
- 87 Ji, S., Hyun, B.G., Kim, K. et al. (2016). Photo-patternable and transparent films using cellulose nanofibers for stretchable origami electronics. *NPG Asia Materials* 8 (8): e299–e299.
- 88 Schenk, M. and Guest, S.D. (2013). Geometry of Miura-folded metamaterials. *Proceedings of the National Academy of Sciences* 110 (9): 3276–3281.
- 89 Wu, W. and You, Z. (2010). Modelling rigid origami with quaternions and dual quaternions. *Proceedings of the Royal Society of London. Series A: Mathematical and Physical Sciences* 466: 2155–2174.
- 90 Stachel, H. (2010). A kinematic approach to Kokotsakis meshes. *Computer Aided Geometric Design* 27: 428–437.
- 91 Schenk, M., Allwood, J.M., and Guest, S.D. (2011). Cold gas-pressure folding of Miura-ori sheets. Steel Research International, Special Issue Proceedings of the International Conference on Technology of Plasticity (ICTP) 2011, pp 459–464.
- 92 Mohammadsalehi, A. and Mostofinejad, D. (2023). Behavior of high-performance concrete canvas Miura-origami structures under flexural loading. *Structures* 54: 928–945.
- 93 Korte, A.P., Starostin, E.L., and van der Heijden, G.H.M. (2011). Triangular buckling patterns of twisted inextensible strips. *Proceedings of the Royal Society of London. Series A: Mathematical and Physical Sciences* 467: 285–303.
- 94 Cheng, Q., Song, Z., Ma, T. et al. (2013). Folding paper-based lithium-ion batteries for higher areal energy densities. *Nano Letters* 13 (10): 4969–4974.
- 95 Lin, C.H., Tsai, D.S., Wei, T.C. et al. (2017). Highly deformable origami paper photodetector arrays. *ACS Nano* 11 (10): 10230–10235.
- 96 Zhang, K., Jung, Y.H., Mikael, S. et al. (2017). Origami silicon optoelectronics for hemispherical electronic eye systems. *Nature Communications* 8 (1): 1782.
- 97 Shi, Y., Zhang, F., Nan, K. et al. (2017). Plasticity-induced origami for assembly of three dimensional metallic structures guided by compressive buckling. *Extreme Mechanics Letters* 11: 105–110.
- 98 Zhang, Y., Zhang, F., Yan, Z. et al. (2017). Printing, folding and assembly methods for forming 3D mesostructures in advanced materials. *Nature Reviews Materials* 2: 17019.
- 99 Lee, W., Liu, Y., Lee, Y. et al. (2018). Two-dimensional materials in functional three-dimensional architectures with applications in photodetection and imaging. *Nature Communications* 9 (1): 1417.
- 100 Guo, X., Wang, X., Ou, D. et al. (2018). Controlled mechanical assembly of complex 3D mesostructures and strain sensors by tensile buckling. *npj Flexible Electronics* 2 (1): 14.
- 101 Adams, J., Duoss, E.B., Malkowski, T.F. et al. (2011). Conformal printing of electrically small antennas on three-dimensional surfaces. *Advanced Materials* 23 (11): 1335–1340.

- 102 Pfeiffe, C., Xu, X., Forrest, S. et al. (2012). Direct transfer patterning of electrically small antennas onto three-dimensionally contoured substrates. *Advanced Materials* 24 (9): 1166–1170.
- 103 Liu, F., Chen Y, Song H et al. (2019). High performance, tunable electrically small antennas through mechanically guided 3D assembly. *Small* 15 (1): 1804055.
- 104 Jobs, M., Hjort, K., Rydberg, A. et al. (2013). A tunable spherical cap microfluidic electrically small antenna. *Small* 9 (19): 3230–3234.
- 105 Fu, H., Nan, K., Bai, W. et al. (2018). Morphable 3D mesostructures and micro-electronic devices by multistable buckling mechanics. *Nature Materials* 17 (3): 268–276.
- 106 Kim, B.H., Liu, F., Yu, Y. et al. (2018). Electronic structures: mechanically guided post-assembly of 3D electronic systems (Adv. Funct. Mater. 48/2018). *Advanced Functional Materials* 28 (48): <https://doi.org/10.1002/adfm.201870344>.
- 107 Ling, Y., Zhuang, X., Xu, Z. et al. (2018). Mechanically assembled, three-dimensional hierarchical structures of cellular graphene with programmed geometries and outstanding electromechanical properties. *ACS Nano* 12 (12): 12456–12463.
- 108 Kim, B.H., Lee, J., Won, S.M. et al. (2018). Three-dimensional silicon electronic systems fabricated by compressive buckling process. *ACS Nano* 12 (5): 4164–4171.
- 109 Xu, R., Lee, J.W., Pan, T. et al. (2017). Designing thin, ultrastretchable electronics with stacked circuits and elastomeric encapsulation materials. *Advanced Functional Materials* 27 (4): 1604545.
- 110 Huang, Z., Hao, Y., Li, Y. et al. (2018). Three-dimensional integrated stretchable electronics. *Nature Electronics* 1 (8): 473–480.