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EDITORIAL

## Art in Science

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The 3rd annual  $\mu$ TAS Art in Science Award was presented to Nicholas Gunn (Fig. 1), University of California, Irvine, at the 14th International Conference on Miniaturized Systems for Chemistry and Life Sciences ( $\mu$ TAS) held in Groningen, The Netherlands, on October 3–7, 2010. The winning image, entitled Cell Block 9, featured on the front cover of issue 6 of *Lab on a Chip* (Fig. 2), is described as a colorized SEM micrograph showing fibroblast cells cultured on microscale pedestals. This ‘micropallet array’ sequesters cells and prevents their migration while allowing for the exchange of soluble factors through the communal growth media covering the array. The full array comprised of over 40 000 pedestals that can be individually released using a focused laser pulse, and recovered with minimal perturbation to the cells that they carry. The work was presented at the

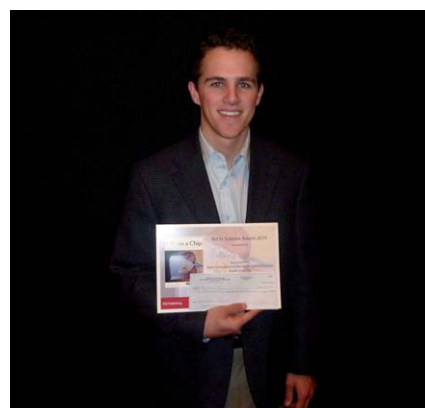


**Fig. 2**  $\mu$ TAS Art in Science winning image, Cell Block 9, reproduced by permission of Nicholas Gunn, University of California, Irvine.

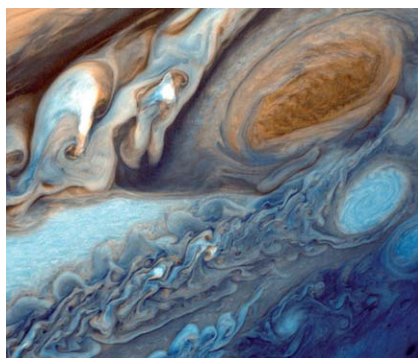
conference in a paper entitled ‘Magnetic Micropallets for Single Adherent Cell Recovery and Analysis’.<sup>1</sup>

The  $\mu$ TAS Art in Science Award was established in 2008 to commemorate the inspiration of scientific discovery and technological advancement that can be conveyed through illustrations of scientific merit.

Prof. Jullio Ottino, Dean of the Robert R. McCormick School of Engineering and Applied Sciences at Northwestern University, presented the opening address for the Art in Science Award in a talk



**Fig. 1** Nicolas Gunn, winner of the  $\mu$ TAS Art in Science Award presented at the 14th International Conference on Miniaturized Systems for Chemistry and Life Sciences Groningen, The Netherlands, October 3–7, 2010.



**Fig. 3** Image of the planet Jupiter, courtesy NASA/JPL-Caltech.



**Fig. 4** The eyepiece of Galileo's telescope. Reproduced with permission from the Museo Galileo, Florence, Italy.

entitled ‘Creativity in Science and Technology: Examples from Fluids, Lessons from Art’ at  $\mu$ TAS 2008. He examined the difference between beauty found in discovery and created in technology. To paraphrase his discussion, the discovery of a natural phenomenon unveils a curtain of ignorance from what has always existed. However, the creation of art requires the use of materials and knowledge combined with artistic

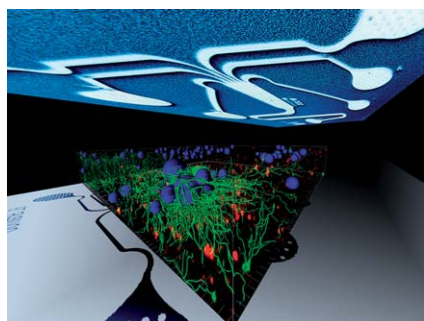


**Fig. 5** Winning image of the 2008  $\mu$ TAS Art in Science Award featured on the cover of February 2009, volume 9, number 3 issue of *Lab on a Chip* submitted by Yu-Wen Huang of Texas A&M University.

NIST, Gaithersburg, USA



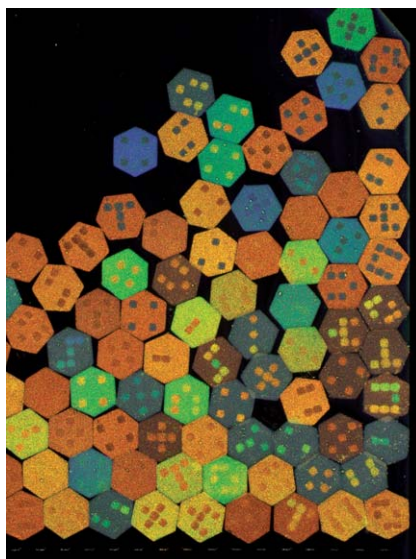
**Fig. 6** Winning image of the 2009  $\mu$ TAS Art in Science Award featured on the cover of March 2010, volume 10, number 6 issue of *Lab on a Chip* submitted by Hyundoo Hwang of the Korea Advanced Institute of Science and Technology (KAIST).



**Fig. 7** 3D neuronal cell culture in microfluidics: Rendered confocal image of fixed and stained neurons (DAPI, NF-L, Synaphoph.) cultured in 3D hydrogel matrix in a microfluidic device. Photograph image of the silicon master for device fabrication was added to the rendered image. Reproduced by permission of Anja Kunze, EPFL, Lausanne, Switzerland.

inspiration to create a work of atheistic appeal. Art is something that would not have existed naturally – it requires the hand of an artist.

The beauty that can be found in discovery is exemplified by an image of the planet Jupiter shown in Fig. 3, which is breathtaking to behold but is not, by this definition, art. An instrument to view that planet is exemplified in Fig. 4, Galileo's telescope, which exists by the hand of the



**Fig. 8** Color-barcoded magnetic microparticles in microfluidic channel: free-floating structural colored particles with multi-axis rotational control using a color-tunable magnetic materials and a new printing method. Our color-barcoded magnetic microparticles offer a coding capacity easily into the billions with distinct magnetic handling capabilities including active positioning for code readouts and active stirring for improved reaction kinetics in microscale environments. Reproduced by permission of Howon Lee, Seoul National University, South Korea.

artist. The miniature world of  $\mu$ TAS is full of examples of art enabled by technology and inspiration. Fig. 5 and 6, winners from the 2008 and 2009 competitions, bring further light to what the art award committee searches for in the high quality submissions received for consideration.

Fig. 7, 8, and 9 are the top contenders from this 2010 competition. Fig. 7, submitted by Anja Kunze from the EPFL in Lausanne, Switzerland is a confocal image of fixed and stained neurons cultured in 3D hydrogel matrix rendered with the microfluidic device used for the culture. Fig. 8, submitted by Howon Lee from the Seoul National University in South Korea, is an image of structural colored particles with color-tunable magnetic materials patterned using a new printing method. Fig. 9, submitted



**Fig. 9** The lineup: Five droplets of identical constituents and volume display gradually decreasing contact angles along the surface energy gradient. The energy gradient is created by controlling the surface roughness of a polydimethylsiloxane (PDMS) substrate through microengineering. Reproduced by permission of Weijie Cyrus Beh, Johns Hopkins University, USA.

by Weijie Cyrus Beh from the Johns Hopkins University, USA, depicts five droplets with gradually decreasing contact angles from a surface energy gradient caused by controlling the surface roughness of a polydimethylsiloxane (PDMS) substrate.

The award winner receives a \$2500 cash prize and publication of the winning image on the front cover of *Lab on a Chip*. The award is organized and sponsored by *Lab on a Chip*, NIST,  $\mu$ TAS, and the Chemical and Biological Microsystems Society (CBMS). The 2010 award committee consisted of Michael Gaitan (NIST, USA), Harpal Minhas (Royal Society of Chemistry, UK), Andreas Manz (KIST, Germany), Yoshinobu Baba (Nagoya University, Japan), and Je-Kyun Park (KAIST, Republic of Korea).

## References

- 1 Nicholas Gunn, , Magnetic Micropallets for Single Adherent Cell Recovery and Analysis, Proceedings of the 14th International Conference on Miniaturized Systems for Chemistry and Life Sciences, 3–7 October 2010, Groningen, The Netherlands, 2010, p. 229.