Publications, patents and talks
PD Dr. rer. nat. habil. Simon Poppinga

Patents

Invention disclosure **VA-CO 2021-22-2021 – Bionischer Sauggreifer**. Inventors: Harald Kuolt, Thomas Speck, Simon Poppinga, Tim Kampowski. Invention disclosure: 12.2021

EP 2320015 – Hingeless, infinitely deformable folding mechanism. Inventors: Knippers J, Lienhard J, Schleicher S, Poppinga S, Masselter T, Speck T. Patent application: 10.11.2009, EP20060743126 / Patent disclosure: 11.05.2011, EP 2 320 015 A2 / Grant of patent: 13.08.2020 (for D, A, CH)

378 003 P-EP – Gelenkloser, stufenlos verformbarer Klappmechanismus. Inventors: Knippers J, Lienhard J, Schleicher S, Poppinga S, Masselter T, Speck T. Patent application: 10.11.2009

Peer-reviewed publications

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83 **Palacios A, Chiriatti L, Poppinga S, Speck T, Le Houérou V (2024)** Smart bioinspired material-based actuators: current challenges and future prospects. *Advanced Functional Materials*. DOI: 10.1002/aisy.202400396

82 **Horstmann M, Speck T, Poppinga S (2024)** Orchestrated movement sequences and shape-memory-like effects in pine cones. *Plants* **13**: 2078. DOI: 10.3390/plants13152078

81 **Mylo MD, Poppinga S (2024)** Digital image correlation techniques for motion analysis and biomechanical characterization of plants. *Frontiers in Plant Science* **14**: 1335445. DOI: 10.3389/fpls.2023.1335445

80 **Vazquez E, Correa D, Poppinga S (2024)** A review of and taxonomy for elastic kinetic building envelopes. *Journal of Building Engineering* **82**: 108227. DOI: 10.1016/j.jobe.2023.108227

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76 **Cheng T, Thielen M, Poppinga S, Tahouni Y, Wood D, Steinberg T, Menges A, Speck T (2023)** Entwicklung bioinspirierter und selbstformender Orthesen per 4D-Druck. *Orthopädie Technik* **74**: 40–49.

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Further publications

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2 **Poppinga S, Müller K, Omlor R (2009)** Darwin entdeckt tierische Eigenschaften an fleischfressenden Pflanzen. In: Schneckenburger S, Omlor R (eds.), *Darwins Garten – Evolution entdecken*. Verband Botanische Gärten e. V., Berlin, pp. 42–43.

1 **Poppinga S (1997)** *Drosophyllum lusitanicum* (L.) Link – Portugiesisches Taublatt. *Das Taublatt* **30**: 4.

Talks, posters, and further contributions

(K) Keynote lecture; (*T) invited talk; (T) regular talk; (Pa) panel discussion; (PT) poster with short talk; (P) regular poster.

2025 (*T) „The hunting cycle of the carnivorous Venus flytrap (*Dionaea muscipula*)“. Lecture for the Master program "Bewegungswissenschaft und Biomechanik" at the Institute for Modelling and Simulation of Biomechanical Systems (IMSB), Computational Biophysics & Biorobotics, University of Stuttgart,, 04.02.2025.

(*T) „Knallige Früchte – Schieß- und Explosionsmechanismen im Pflanzenreich“. Online lecture for the Hessian jury meeting „Jugend forscht“, 20.01.2025.

2024 (*T) „Biomechanics, functional morphology, and biomimetics of plants (and animals)“. Biological colloquium on functional diversity and evolution of plants, Faculty of Biology, TU Dresden, 21.11.2024.

(T) „Biomechanik des „Saugens“ beim Blutegel und fleischfressenden Wasserschlauch". Lecture for the the Friend‘s Association of the Botanical Garden of TU Darmstadt, 12.10.2023.

(T) „Wie fleischfressende Pflanzen ihre Beute fangen". Lecture for children as part of the "open day" and anniversary festival of the TU Darmstadt Botanical Garden, 15.9.2023, Darmstadt.

(*T) "Biomechanics of snapping, reopening and closing of the trap of *Dionaea muscipula*". Invited lecture for the 40 Years G.F.P. & ICPS-Conference, Austria, Vienna, 24.5.-29.5.2024.

(K) „Biomechanics of plant-animal interactions". Keynote for the 5th DZG Young Researcher Meeting Morphology, February 24th, Darmstadt, Germany.

(*T) „Baubionik - Botanik bewegt Architektur". Online lecture for the DASA Arbeitswelt exhibition "Bio.Inspiration - Eine Ausstellung über die Natur als Vorbild", 11.1.2024.

2023 (*T) „Plant movement physics and biomimetics". Online lecture for the ARCH 193 - Design Studio, organized by David Correa, Waterloo, Canada, 11.10.2023.

(T) „Knallige Früchte – Explosions- und Schleudermechanismen im Pflanzenreich". Lecture for the the Friend's Association of the Botanical Garden of TU Darmstadt, 12.10.2023.

(*T) „Wie fleischfressende Pflanzen ihre Beute fangen". Children's lecture as part of the opening of the TU Darmstadt „Wissenschaftsschloss", 16.9.2023, Darmstadt.

(*T) „Biomechanik und Ökologie der aquatischen fleischfressenden Pflanzen *Utricularia australis* (Lentibulariaceae) und *Aldrovanda vesiculosa* (Droseraceae)". Lecture at the "57. Hessischer Floristentag", 15.9.2023, Darmstadt.

(*T) „Wie fleischfressende Pflanzen ihre Beute fangen - und die Technik inspirieren". Invited talk for the Akademie55plus, 17.5.2023, Darmstadt.

(*T) „Biomechanics, functional morphology, and biomimetics of motile plant structures". Q-Net workshop on "Plant cell walls - structure, function, composition", 19.02.2023

2022 (*T) „These plants and animals suck". Christmas lecture for biology students of the TU Darmstadt, organized by the student's council, 22.12.2022

(*T) „Wie fleischfressende Pflanzen ihre Beute fangen". Children's lecture, Bürgerverein Darmstadt, 17.12.2022

(*T) „How plants move and inspire technology". Online lecture for the ARCH 193 - Design Studio, organized by David Correa, Waterloo, Canada, 14.11.2022

(*T) „A biomechanical perspective on stress response and resilience of plants". Talk in the symposium „Stress response and resilience of plants and ecosystems", Ulm University, 9.11.2022.

(*T) „Schnappen, klappen, schleudern – Wie Pflanzen sich bewegen und die Technik inspirieren". Studienstiftung Projektwoche in Weimar, 27.09.2022.

(*T) „Baubionik – Botanik inspiriert Architektur". Lecture for the the Friend's Association of the Botanical Garden of TU Darmstadt, 15.09.2022

(*T) „Schnappen, klappen, schleudern – Wie Pflanzen sich bewegen und die Technik inspirieren". Biological colloquium, TU Darmstadt, 14.07.2022.

(*T) „Schnappen, klappen, schleudern – Wie Pflanzen sich bewegen und die Technik inspirieren". Lecture for the series „Was steckt dahinter?", TU Darmstadt, 24.05.2022.

(*T) „Wie fleischfressende Pflanzen ihre Beute fangen". Lecture for the the Friend's Association of the Botanical Garden of TU Darmstadt, 19.05.2022.

2021 (*T) „Plant movement physics and biomimetics". Botany Seminars @ LMU Munich, online presentation, 01.12.2021.

(*T) „Plant movement biomimetics: Blurring the frontiers between living and technical systems". BASF-JONAS Family Days, online presentation, 24.09.2021.

2020 (*T) „Suckers, snappers, and catapults: How carnivorous plants catch their prey". Monday Seminar series @ Department of Systematic and Evolutionary Botany, University of Zürich (online presentation), 12.10.2020.

(*Pa) Panel on smart buildings/adaptive architecture. The Convergence Center for Living Multifunctional Material Systems (LiMC2) webinar, July 23 (online).

(*T) „Plant movements as models for novel bioinspired façade shading systems I". The Convergence Center for Living Multifunctional Material Systems (LiMC2) webinar, July 22 (online)

(*T) „Schnappen, saugen, schleudern: Wie fleischfressende Pflanzen ihre Beute fangen". Biologisches Kolloquium Universität Ulm, AG Jansen, 28.01.2020.

(T) „Abstraction of slow and fast plant movement principles for the technical transfer into biomimetic motile structures". Annual Meeting of the Society for Integrative & Comparative Biology, 03-07.01.2020, Austin, TX, USA.

2019 (*T) „Wie Pflanzen sich bewegen und die Architektur inspirieren". Waldhaus Freiburg, 17.10.2019

(K) „Biomechanics, functional morphology, and diversity of *Utricularia* suction traps". Plant Biology CS 2019, Budweis, Czech Republic.

(P, together with Westermeier A, Speck T) „Visualisation of delicate plant soft tissue via µ-computer tomography: the snap-traps of the carnivorous aquatic *Aldrovanda vesiculosa* as a case study". Plant Biology CS 2019, Budweis, Czech Republic.

(*T) (P, together with Speck T) „Plant movements as concept generators for smart biomimetic actuators". BASF-JONAS Family Days, Ludwigshafen, 06.-07.05.2019.

(*T) „Structural, mechanical, and kinematical adaptations to desiccation". 2nd FAPESP-DFG joint workshop on desiccation-tolerant Velloziaceae from tropical inselbergs: a model family for better understanding species evolution on terrestrial islands. 25th-29th March 2019, Rostock, Germany

2018: (T) „Abstraction of slow and fast plant movement principles for the technical transfer into biomimetic structures". 9th International Plant Biomechanics Conference, Montreal, Canada, 09.-14.08.2018.

(P, together with Thielen M, Speck T) „4D-printed material systems for sports and medicine inspired by the deformation of butterwort (*Pinguicula* sp.) leaves". 9th International Plant Biomechanics Conference, Montreal, Canada, 09.-14.08.2018.

(P, together with Speck T, Eberhard L, Gallenmüller F, <u>Kampowski T</u>) „Leech suction in air and under water: secure attachment on plant leaves and other biological surfaces". 9th International Plant Biomechanics Conference, Montreal, Canada, 09.-14.08.2018.

(*T) „Suckers and snappers - New insights into the ultrafast traps of *Utricularia* and *Aldrovanda*". ICPS European Exhibition and Exchange, Bonn Botanic Gardens, 30.06.2018, Germany.

(*T) (P, together with Schenck P, Speck T, Correa D, Menges A, Nestle N, Bruchmann B) „Abstraction of slow and fast plant movement principles for the technical transfer into biomimetic structures". BASF-JONAS Family Days, Ludwigshafen, 20.-21.03.2018.

2017: (*T) „Functional morphology and biomechanics of the fast traps of *Aldrovanda vesiculosa* and *Utricularia* spp". ICPS European Exhibition and Exchange, Hortus Botanicus Leiden, 13.08.2017, Netherlands.

(T) „How the Venus flytrap snaps revisited". The Society for Experimental BiologyAnnual Main Meeting, 03.-06.07.2017, Gothenburg, Sweden.

(P, together with Correa D, Menges A, Nestle N, Bruchmann B, Speck T) „Pine cone seed scales as role models for adaptive flaps in architecture". The Society for Experimental Biology Annual Main Meeting, 03.-06.07.2017, Gothenburg, Sweden.

(*T) (P, together with Speck T) „Smart materials for sustainable architecture: Bio-inspired fiber-reinforced flap and scale structures for self-adaptive heat and humidity regulation". BASF-JONAS Family Days, Ludwigshafen, 12.-12.04.2017.

2016: (T) „3D-gedruckte, bewegliche Strukturen inspiriert von langsamen und schnellen Pflanzenbewegungen". 8. Bionik-Kongress - Patente aus der Natur, Bremen, 21.-22.10.2016.

(P, together with Westermeier AS, Born L, Sachse R, Vögele P, Körner A, Bischoff M, Knippers J, Gresser GT, Speck T) „Catching inspiration from the carnivorous plant *Aldrovanda vesiculosa* - Biological role model of the shading system Flectofold". 8. Bionik-Kongress - Patente aus der Natur, Bremen, 21.-22.10.2016.

(P, together with Born L, Westermeier AS, Sachse R, Körner A, Bischoff M, Knippers J, Speck T, Gresser GT) „Catching inspiration from the carnivorous plant *Aldrovanda vesiculosa* - Technical implementation of the shading system Flectofold". 8. Bionik-Kongress - Patente aus der Natur, Bremen, 21.-22.10.2016.

(P, together with Kampowski T, Mylo MD, Demandt S, Speck T) „The impact of water stress on morphological and biomechanical properties of desiccation-tolerant and desiccation-intolerant Gesneriaceae". 8. Bionik-Kongress - Patente aus der Natur, Bremen, 21.-22.10.2016.

(P, together with Kampowski T, Eberhard L, Gallenmüller F, Speck T) „Medicinal leeches suck, don't they? Investigating the functional morphology and general attachment performance of *Hirudo verbana* suction discs". 8. Bionik-Kongress - Patente aus der Natur, Bremen, 21.-22.10.2016.

(P, together with Speck T) „Pine cone seed scales as role models for adaptive flaps in architecture". Statusworkshop des Kompetenznetzes „Funktionelle Nanostrukturen", 06.-07.10.2016, Bad Herrenalb.

(*T) „How plants move, and how the motion principles can inspire new technologies". Online lecture with Studio One, Berkeley University (Prof. Simon Schleicher), 26.09.2016.

(*T) „New insights into the biomechanics and functional morphology of active carnivorous plant traps". International Carnivorous Plant Society Conference, Kew Gardens, London, UK (07.08.2016)

(*T) „Snappers, suckers & catapults: How motile carnivorous plants catch prey". Talk accompanying the science festival at Kew Gardens, London, UK (06.08.2016)

(P, together with Speck T) „Pine cone seed scales as role models for adaptive flaps in architecture". The Society for Experimental Biology Annual Main Meeting, 04.-07.07.2016, Brighton, UK.

(P, together with Adamec L) „Measurement of the critical negative pressure in traps of aquatic carnivorous *Utricularia* species". Plant Biology Europe EPSO/FESPB Congress, June 26-30, Prague, Czech Republic.

(*T) (P, together with Speck T) „Smart materials for sustainable architecture: Bio-inspired fiber-reinforced flap and scale structures for self-adaptive heat and humidity regulation". BASF-JONAS Family Days, Ludwigshafen, 12.-13.04.2016.

2015: (*T) „New insights into the passive nastic motions of pine cone scales and false indusia in ferns". 8th International Plant Biomechanics Conference, Nagoya, Japan (30.11-04.12.2015).

(*T) „Bewegung ohne Gelenke". 2. Bocholter Bionik-Workshop, 06.11.2015.

(P, together with Kampowski T, Mylo MD, Speck T) „Adaptive mechanics and reinforcement in herbaceous plants". Statusworkshop des Kompetenznetzes 'Funktionelle Nanostrukturen' + 'BioMat-S' + 'CleanTech', Bad Herrenalb, 01.-02.10.2015.

(T) „The passive nastic movements of pine cones and of false indusia in ferns". The Society for Experimental Biology Annual Main Meeting, Prague, Czech Republic, 30.06.-04.07.2014.

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