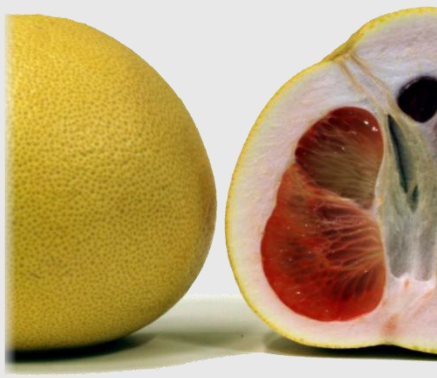
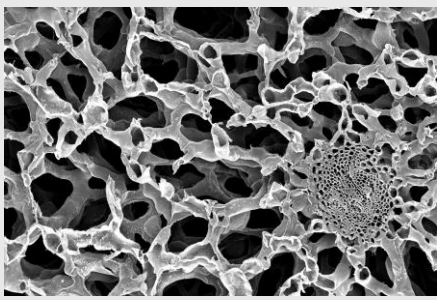
+BIOMIMETIC

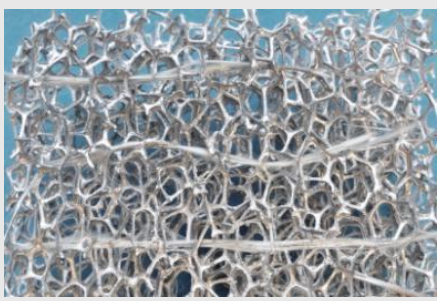
IMPACT PROTECTION

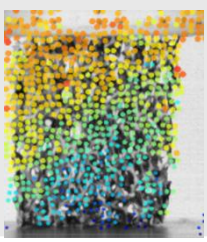
The pomelo (*Citrus maxima*) is one of the heaviest fruits. Its extraordinary thick and foamy peel offers an ideal protection against dynamic loads. Thus, this hierarchically structured protective layer constitutes a perfect role model for the development of biomimetic crash-absorbers with excellent damping properties.

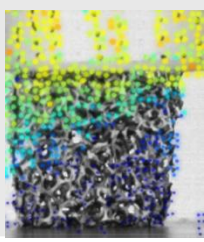


Pomelos even survive free falls from heights of 15 m almost undamaged. Therby the kinetic energy is, for the most part, dissipated by the peel. From a technical point of view, the latter can be regarded as a fibre reinforced sandwich structure consisting of open-pored and closed-pored foams with varying pore sizes. The gradual transition between the different pore sizes is realized by a complex three dimensional network of biological cells. Impact pro-tection of fruits is mainly achieved by structural adaptations of their peel. Considering the foamlike structure and the good me-chanical properties, especially with regard to their low density, the pomelo peel represents an excellent role model for the development of optimized casted metal foams. A first generation of prototypes has been developed and produced, and is currently being tested. The further course of the project includes adap-tations of the casting process as well as the examination of macadamia nuts and coconuts with regard to impact and penetration protection, which will be transferred to the development of a second generation of prototypes.









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http://spp1420.mpikg.mpg.de/projects/impact-resistant-hierarchically-structured-materials-based-on-fruit-walls-and-nut-shells

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