



## **Low-carbon and more sustainable materials for construction – a Brazilian experience**

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### **Abstract**

Vegetable fibers are a hierarchical structure material in the macro, micro and nano- scales that have been used in cementitious materials and other reinforcing applications. In hybrid reinforcement, with micro and nanofibers, nanofibrillated cellulose forms bonding with the matrix and acts as stress transfer bridges in the nano-cracking with corresponding strengthening of the cementitious composite. Processing plays a significant role on performance of the resulting composite. The extrusion process strongly depends on the rheological characteristics of the fresh cement material but it can better organize the microstructure of the fiber cement due to the partial orientation of the fibers in the extruder direction. Curing process also plays a key role in the performance of the final product. Accelerated carbonation at early age is a promising technology and a strategy to mitigate the durability issues with the composite materials. Alternative MgO-based clinker free binder is presented as a suitable alternative to clinker-based products reinforced with cellulosic pulps. Degradation during the service life is equally crucial for the evaluation of the durability of the resulting materials and components in real applications exposed to different environmental conditions. Engineered bamboo is also assessed as alternative nonconventional material for structural and nonstructural (such as boards) elements. More sustainable and high performance components based on engineered natural raw materials for civil construction can bring valuable contributions for the affordable housing in particular to developing regions.

### **Bio**

Holmer Savastano Junior is a civil engineer (USP Brazil, 1984) and doctor in civil construction engineering (USP, 1992). He has a post doctorate in the Forestry and Forest Products, CSIRO (Australia, 1998-99) and collaboration with Brazilian and international research groups and partnerships with the industry since 2001. Holmer is a Professor of the University of São Paulo (2005) and he is the coordinator of the Research Center on Materials for Biosystems – BioSMat, USP since 2012. He was the supervisor of 28 concluded doctorates and published 240 full papers in peer-reviewed journals with around 4,600 citations (Web of Science). His main area of interest is in the field of composite materials containing residual and non-conventional resources to sustainable and eco-friendly housing and infrastructure.