Thermal deactivation of asbestos-cement, recycling, eco-compatibility and sustainability

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Asbestos-cement, i.e. the hazardous construction material still widespread in the built environment, can be efficiently deactivated by thermal processes and recycled in a variety of commodities as secondary raw material. Tests have been successfully conducted in sanitary ware ceramics, mortar, rockwool and polymers (including eco-friendly polylactic acid, PLA). Among these, the most promising concern: mortar, where up to 7 wt. % of deactivated asbestos cement (DAC) can be added without compromising the workability of the mixture and slightly improving the mechanical properties of the final product; epoxy resin, where up to 30 wt.% of DAC can be embedded improving hardness and wear resistance of the composite; stonewool, where a mixture of 50:50 diabase:DAC can be fiberized obtaining mechanical and thermodynamical properties comparable to commercial stonewool (Capitani et al., 2024a, 2024b and references therein). Additional tests are currently in progress with construction bricks, geopolymers and cement.

However, for a process to be upscaled at industrial level, safety of the deactivated asbestos cement and sustainability of the whole process have to be assessed. In this regard, the results of a recent study (Negri et al., 2025) about the effects of DAC on the soil ecosystem through the soil model organism *Folsomia candida* (Collembola), suggest that improper disposal or soil contamination by DAC may pose ecological risks, reinforcing the convincement that recycling DAC into stable matrices, such as ceramics or mortar, minimizes environmental contamination while promoting circular economy. Moreover, the results of life cycle assessment combined with cost–benefit analysis (Ferrini et al., 2024), suggest that deactivation technologies may represent a sustainable alternative to landfilling, although their success is dependent on securing public funding, a thorough examination of hidden environmental costs and risks, and the establishment of supportive regulations promoting circular economy. All together these findings suggest that the time is ripe to make asbestos treatment options a global reality.

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