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Editors:

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Activated carbon and magnetite affect the methanogenic activity of acetoclastic and hydrogenotrophic methanogens

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Abstract

Conductive materials (CM) improve the efficiency of methane production (MP) in anaerobic digestion (AD) processes (Martins et al. 2018), but little is known on the impact of CM directly on methanogens. Different species of methanogens were shown to be differentially affected by carbon nanotubes (CNT) (Salvador et al. 2017; Zhang, Zhang, and Lu 2018). For instance, CNT increased significantly the activity of an hydrogenotrophic methanogen (*Methanobacterium formicicum*) (Salvador et al. 2017), but other methanogenic species were less affected (Salvador et al. 2017; Zhang, Zhang, and Lu 2018).

In this study, we evaluated the effect of other CM (activated carbon (AC) and magnetite (Mag), at 0.5 g/L) on the activity of both hydrogenotrophic (*M. formicicum* and *Methanospirillum hungatei*) and acetoclastic (*Methanosarcina barkeri* and *Methanosaeta harundinacea*) pure cultures of methanogens.

The presence of AC resulted in reduced lag phases preceding the MP, and faster initial MP rates (IMPR), which was more evident in *M. formicicum* cultures (IMPR increased 15 times). Magnetite inhibited the activity of *M. formicicum*, and showed a minor impact in the activity of the other methanogens.

Author Keywords. Conductive materials, anaerobic digestion, methane production, methanogens.

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