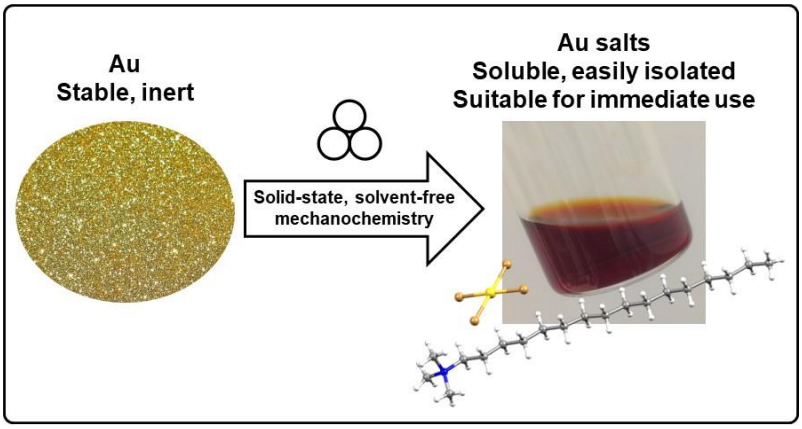
Rapid, Clean, and Sustainable Transformation of Gold by Oxidative Mechanochemistry

Jean-Louis Do, Thomas Auvray, Hatem M. Titi, Louis A. Cuccia, and Tomislav Friščić
Department of Chemistry, McGill University
Department of Chemistry and Biochemistry, Concordia University

Elemental gold and its soluble derivatives are highly valued and have become pivotal in numerous fields that range in scales from industrial to academic, specifically from the production of electronics to chemical synthesis and catalysis.[1] As a noble metal, however, gold is highly chemically inert which, while beneficial for its many applications, makes the production and processing of this metal highly tantalizing and based on highly aggressive processes and toxic reagents.[2] Thus, the development of new, clean, sustainable, and direct activation, processing, and recycling methods is extremely important.



Mechanochemical reactions have steadily gained attention in recent years as opportunities for unique, cleaner, as well as more efficient reactivity.[4-5] This presentation will highlight mechanochemistry as the enabling element in developing more sustainable, environmentally-friendly strategies to transform elemental gold from enriched and waste sources into water-soluble derivatives.[6] The mild nature of the presented process is further outlined through the transformation of elemental gold into organosoluble derivatives that are readily purified using benign solvents.

References: [1] Lin et al., *Angew. Chem. Int. Ed.*, **2010**, *49*, 7929-7932; [3] Renner et al., Gold, Gold Alloys, and Gold Compounds, *Ullmann's Encyclopedia of Industrial Chemistry* (Wiley-VCH Verlag GmbH, 2000) [4] Do, Friščić *ACS Cent. Sci.* **2017**, *3*, 13; [5] Do, Friščić *Synlett* **2017**, *28*, 2066 [6] Do, Tan, Friščić, *Angew. Chem. Int. Ed.*, **2018**, *57*, 2667.