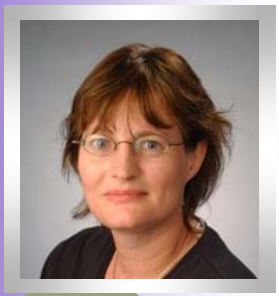
# A method for synthesizing heavy alkaline earth metal amides and other metal-organic compounds using triphenylbismuth



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## Invention

Highly reactive, heavy alkaline earth metal organic compounds have a high potential for synthetic, polymer, and solid-state applications. However, current methods for formation of these derivatives suffer from the lack of suitable reagents and source materials. Metathesis methods require expensive starting materials as well as stringent reaction and work-up conditions to prevent product contamination by alkali metal halides. While direct metallation often produces agreeable results for barium, the methodology is of limited use for the lighter metals. Additionally, current redox transmetallation-ligand exchange (RTLE) synthesis techniques require the use of a diarylmercury to obtain high yields, and mercury is toxic. This technology describes a method for efficient formation of heavy alkaline earth metal organic compounds through an environmentally sensitive process while using inexpensive, commercially available starting materials.

## Technology

Redox transmetallation-ligand exchange synthesis is performed using triphenylbismuth ($BiPh_3$) as a reagent to form alkaline earth amides and a variety of hydrocarbons including (but not limited to) cylopentadienides, ß-diketonates, and diketiminates, in a facile manner.

## Applications

Facile, inexpensive preparation of pure alkaline earth metal organic compounds for use in synthetic, polymer, and solid-state applications. Importantly, the method provides high yields of the currently very expensive to obtain calcium, strontium, and barium derivatives.

## Advantages

The starting materials are:

- low in toxicity
- commercially available
- relatively inexpensive
- with the exception of the alkaline earth metals, air and moisture

The process is:

- efficient (provides high yield)
- environmentally sensitive
- widely applicable, encompassing a range of alkaline earth metal species, including amides
- capable of providing clean products after easy work-up

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