Electrochemical Flash Fluorination and Radiofluorination

Tech ID: 29432 / UC Case 2018-451-0

SUMMARY

Researchers led by Saman Sadeghi from the Department of Molecular & Medical Pharmacology at UCLA have developed a new and simple process to make fluorinated organic compounds.

BACKGROUND

Organic compounds functionalized with fluorine atoms have distinguished physical, biological, and chemical properties that allows for their use and applications in many fields, including pharmaceuticals, agriculture, and materials science. Fluorinated organic compounds usually have longer half-lives before being metabolized due to their chemical inertness. This comes into use in manufacturing medications and for imaging through PET scans using radioactive fluorine. Fluorinated organic compounds rarely occur naturally and must be synthesized artificially. Typically, these processes use fluorine gas and anhydrous hydrofluoric acid, but these processes are costly, volatile, and hazardous. Other fluorination techniques require complicated processes, ideal conditions, and have unstable precursors. The nature of these processes to make radioactive fluorinated compounds requires radioactive fluorine to be on hand rather than made freshly. This causes rapid decay of the radioactive fluorine before it is even used in the synthesis process.

INNOVATION

Researchers led by Saman Sadeghi from the Department of Molecular and Medical Pharmacology at UCLA have developed a new and simple process to make fluorinated organic compounds. This innovation uses electrochemistry to fluorinate organic compounds in one step under mild conditions without the complexity, cost, and hazards of previous synthetic methods. This process can work on aromatic rings which are typically very difficult to fluorinate. The inventors have also found a way to stabilize precursor products made electrochemically before fluorination. This is especially beneficial in making radiofluorinated products by allowing radioactive fluorine to be freshly made, and thus minimizing radioactive decay to produce higher yield and quality.

APPLICATIONS

Fluorination of organic compounds:

- Agriculture
- Pharmaceuticals
- Materials science
- Solvents

Radiofluorination of organic compounds:

- Radioactive medical imaging

ADVANTAGES

- Inexpensive
- Safe
- Mild conditions
- High yielding

PATENT STATUS

Country	Type	Number	Dated	Case

CONTACT

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INVENTORS

- Sadeghi, Saman

OTHER INFORMATION

KEYWORDS

fluorination, flash fluorination, radiofluorination, organic molecules, cation pool, carbocations, electrochemical oxidation

CATEGORIZED AS

- **Biotechnology**
  - Other
- **Materials & Chemicals**
  - Chemicals
  - Other
- **Medical**
  - Imaging
  - Research Tools
- **Research Tools**
  - Reagents
- **Engineering**
  - Other

RELATED CASES

2018-451-0

United States Of America	Issued Patent	11,779,665	10/10/2023	2018-451	

Additional Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Synthesis of Fluorinated Radiopharmaceuticals via Electrochemical Fluorination

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