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# Perfluoro/polyfluoroalkoxylsulfonyl fluorides – precursors to new ion conductors, fuel cell electrolytes and polymeric coatings

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## 1. Introduction

Pefluoro/polyfluoroalkoxylsulfonyl fluorides continue to be subjects of considerable interest because of their utility in preparing advanced materials containing the sulfonyl fluoride grouping ($=SO_2F$) or its derivatives.

## 2. Results and discussion

### 2.1. Perfluoroalkanesulfonyl fluorides, $FSO_2(CF_2)_nSO_2F$

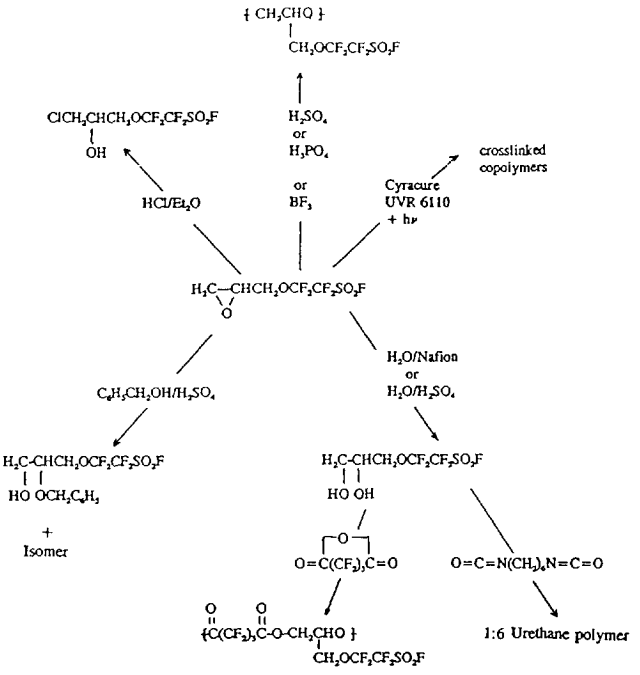
These compounds were converted to their corresponding sulfonic acids, $HSO_3(CF_2)_nSO_3H$ with $n=2$, 4, 6, and lithium salts, $LiSO_3(CF_2)_nSO_3Li$ with $n=1$–4. Evaluation of the acids as fuel cell electrolytes [1] and of the lithium salts as ion conductors have been carried out [2].

### 2.2. $SF_5$ sultones, $SF_5\overbrace{CXCF_2OSO_2}$ $(X=H,F)$

$SF_5$-containing sultones were used to prepare the following $SF_5$-containing acids: $SF_5CH_2SO_3H$, $SF_5CHFSO_3H$ and $SF_5CF_2SO_3H$. The possible use of these acids as fuel cell electrolytes looks promising. Lithium salt complexes over the stoichiometric range $(CH_2CH_2O)_xLiA$ $(A=SF_5CFHSO_3, SF_5CF_2SO_3)$ with $x=4$–16 have been prepared and evaluated [2]. Surprisingly, these complexes showed conductivities in the range reported for complexes of polyethylene oxide with $LiN(SO_3CF_3)_2$ and $LiC(SO_3CF_3)_3$.

### 2.3. Epoxyalkylsulfonyl fluoride, $\overbrace{OCH_2CHCH_2}OCF_2CF_2SO_2F$

This epoxide was used to prepare a number of interesting derivatives as shown in Scheme 1 [3,4]. Photocured copolymer films containing various amounts of $FSO_2$ epoxide monomer and a commercial cycloaliphatic diepoxide were analyzed by X-ray photoelectron spectroscopy and secondary ion mass spectroscopy. Preliminary results indicated significant fluorine concentrations in the outer surface of the film [5].




Scheme 1. Compounds derived from epoxyalkylsulfonyl fluoride, $\overbrace{OCH_2CHCH_2}OCF_2CF_2SO_2F$.

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