Fluorochemicals: The Future We Want

Fluorochemicals quietly power our modern lives serving as medicines, agrochemicals and strategic materials including refrigerants, batteries and electronics. All fluorochemicals are prepared from — the now critical — mineral Fluorspar (CaF_2). The first step of any synthesis is the conversion of Fluorspar to hydrogen fluoride (HF) upon treatment with H_2SO_4 at 300 °C, a process reported by Scheele in 1771. Highly toxic HF has caused serious accidents, some with fatal casualties and severe damage to the environment. The fluorochemical industry is today exposed to supply shortages, safety constraints and environmental damage. Our goal is to reinvent fluorine chemistry from the ground up with innovative, safe and economically viable Fluorspar technologies that bypass HF, and with processes to recover the fluorine content of waste fluorochemicals such as PFAS for a circular fluorine economy. Such ground breaking development could support the fluorine sector, protect workers, simplify supply chains, and reduce the energetic and environmental burden of fluorochemical production. This lecture will discuss our results to date, and our approach to bridge the gap between academic discoveries and societal impact.