# Rapid Reduction of Sodium Occupancy in Type II Silicon Clathrate by Chemical Etching

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**Summary:** A method to reduce the sodium occupancy in type II silicon clathrate

**Description:** A chemical etching technique is used to reduce the sodium occupancy in type II silicon clathrate. This technique is efficient at rapid removal of sodium, compared to the traditional method where the sodium containing silicon clathrate is annealed for several days. Additionally, the chemical etching process preferably etches type I clathrate. Since type II clathrate synthesis mostly results in less than 5 wt.% type I impurity phase, the chemical etch technique serves to eliminate the type I phase. This rapid removal of sodium by chemical etching is important for synthesizing phase pure semiconducting clathrates.

**Main Advantages of this Invention:**

- Selectively etch type I silicone clathrate

**Potential Areas of Application:**

- Semiconductors

**ID number:** 14019

**Intellectual Property Status:** US utility patent pending (application #14/612,002)

**Opportunity:** We are seeking an exclusive or non-exclusive licensee for the implementation of this technology.

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