Cleaning of contaminated optics elements by synchrotron radiation using atomic hydrogen generated with hot wire

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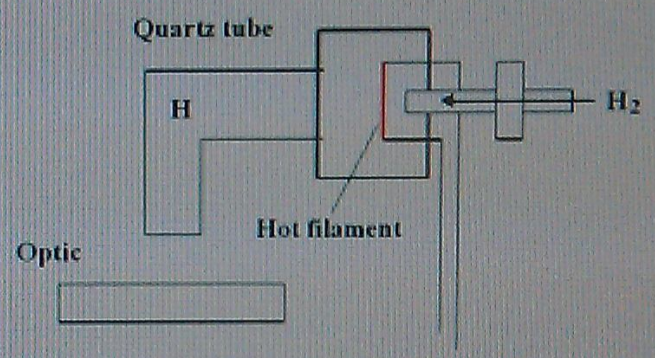
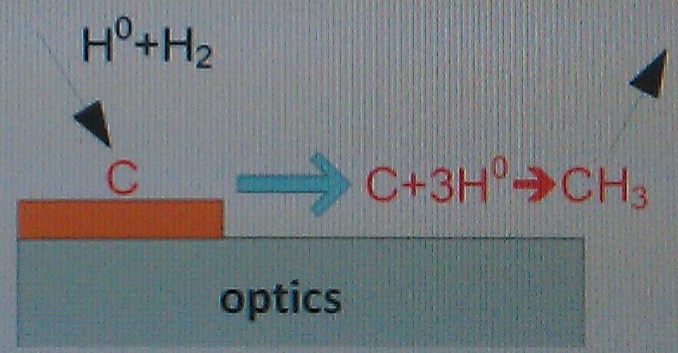
Carbon contamination of optics elements has become an increasingly serious problem with the development of high-brightness synchrotron radiation sources since carbon deposited on surfaces of optics elements may results in severe flux losses, especially at K-edge.

A damage-free method of removing carbon contamination from optics has been developed that employs atomic hydrogen generated by thermal dissociation of molecular hydrogen using a heated catalyzer consisting of a W (tungsten) filament. Atomic hydrogen cleaning can both volatilize carbon and reduce or eliminate the risks of oxidation of the optics associated with cleaning with ions. In case of oxide formation on top surface layers atomic hydrogen cleaning can also reduce the surface oxide of the optics to restore its reflectivity.

In addition, the transport of atomic hydrogen thorough a winding quartz tube was demonstrated



Schematic of atomic hydrogen cleaning and transport apparatus



Principle of atomic hydrogen cleaning