E-Stat chemical conversion systems are designed for the purpose of converting airborne chemical particulate materials into air-vapor mixtures in order to permit traditional chemical vapor detection systems to identify low-vapor pressure airborne chemical threats. To perform this function the E-Stat chemical systems combine electrostatic precipitation methods with high temperature volatilization.

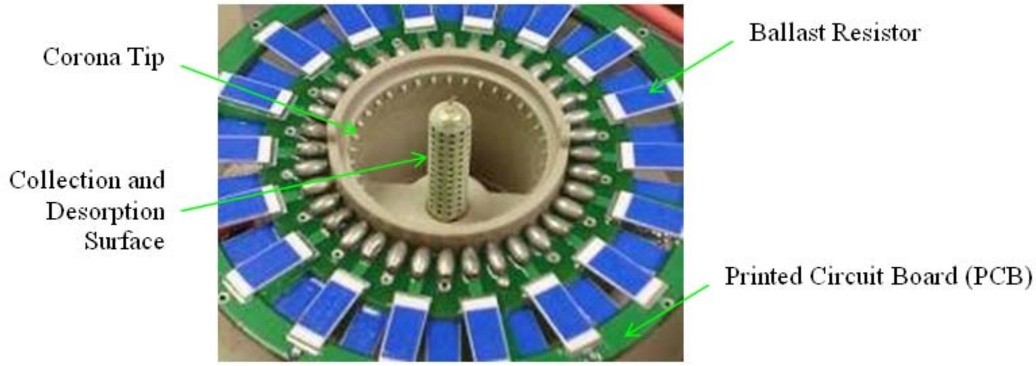
The electrostatic collection method allows these systems to operate at high collection efficiencies on very low power. The vapor conversion of target material is accomplished by rapidly heating a low mass collection surface. All combined, the use of these processes allow these systems to be very efficient, compact, and lightweight. Additionally the design can allow simple retrofit onto existing chemical detection systems.

In the chemical conversion systems, electrostatic particle collection is accomplished by using high voltage (8-18kV) to generate an electrical corona between specially designed mechanical points, or corona tips, and a conductive collection surface. This corona causes particles within its area of influence to become charged to the same polarity as the corona. The corona charging effect is extremely high and the particles obtain a significant amount of charge within a very small amount of time. Once charged these particles then begin to quickly migrate within the field due to electrostatic phenomena towards the collection surface where they quickly deposit.

As with all of our electrostatic collection technologies, the voltage provided to the corona tips is allowed to float while the total current being transferred across the gap between the tips and the collection surface is held fixed. This allows the system to compensate for reasonable time based variations in the particulate loading and the dielectric constant of the air within the collector without arcing or causing the corona formation to fail. As is reasonably widely known, humidity and other factors can significantly affect the dielectric constant of air and cause traditional fixed voltage systems to fail.

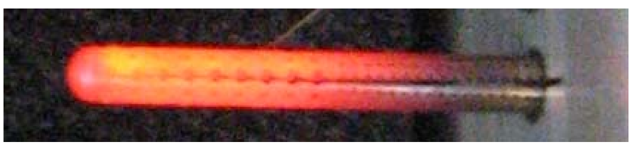
In addition to the current control, another unique feature of the Evogen chem. Conversion systems is the inverted collection arrangement as compared to traditional electrostatic precipitators (ESP's). Traditional ESP's generally utilize a variant of wire in tube or point to plane geometry. In the wire i n tube geometry a wire in the center of the system generates a corona and causes particulate material to be collected outwardly on a surrounding tube. The drawbacks of this relative to our chemical conversion application is that this greatly increases the collection surface area which in turn requires significant additional power to heat the surface and effect desorption of collected material. With an inverted design such as Evogen's wherein the collection surface is centrally located and the corona originates from an outer surface, the collection surface area may be substantially reduced and therefore power requirements can be minimized.

An example of the core collection and desorption system for Evogen's electrostatic chemical conversion systems is shown below. The perforated central collection surface shown in the photo permits vaporized chemical particulate to be efficiently captured and drawn into a heated transfer tube to an identifier.



In this configuration the system can be operated in both batch and continuous conversion mode. In other words for batch mode, the system can be caused to collect particulate material for a prescribed amount of time in order to build up a higher concentration of target material. The desorption can then be commanded, higher vapor pressure impurities burned off, and a highly concentrated bolus of target material can be desorbed and transferred to analysis. In continuous conversion mode desorption and collection can occur simultaneously, wherein collected target is almost instantly volatilized and transferred out to an identifier.

Temperature control of the desorption system is critical in order to ensure the desorption or pyrolization process in batch mode produces a sharp, high concentration bolus of vapor. An example of an overheated collection/desorption surface is shown below to illustrate the temperature distribution of the desorption surface in the primary collection zone. The vast majority of the collected particulate is deposited on the left-most half of the collection electrode.



Evogen's current controlled methodology and inverted radial collection for air sampling was originally conceived by the Sarnoff Corporation and licensed to Evogen. Evogen has since modified the technology and further developed it to make it