Plasma-in-a-bag for sterilizing devices

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The practice of sterilizing medical tools and devices helped revolutionize health care in the 19th century because it dramatically reduced infections associated with surgery. Through the years, numerous ways of sterilization techniques have been developed, but the old mainstay remains a 130-year-old device called an autoclave, which is something like a pressure steamer. The advantage of the autoclave is that the unsterile tools can be packed into sealed containers and then processed, staying sealed and sterile after they are removed.

Norbert Koster and his colleagues at TNO Science and Industry, an independent research organization in the Netherlands, are developing a new way to sterilize medical devices by sealing them inside plastic bags and then using electromagnetic fields to create plasmas -- partially ionized gasses that contain free electrons and reactive ions. Scientists have known for a long time that plasmas have the ability to kill bacteria and sterilize objects, but the major problem has always been that plasma-sterilized objects still had to be packed into a sealed container afterwards. There was no way to sterilize them inside sealed containers.

Now Koster and his colleagues have developed a way to do just that, to be presented on November 13 at a meeting of AVS in San Jose. They found a way to sterilize medical tools by sealing them inside vacuum bags and then placing them in chambers that are at even lower pressure. This causes the vacuum pack around the tools to puff out. Then they use an electromagnetic field to remotely ignite a plasma inside the bag, killing the bacteria and viruses therein. When the process is finished and the bag is removed from the chamber, the outside pressure causes it to

shrink down again to closely wrap the now sterilized objects, keeping them sealed.

At the moment, Koster and his colleagues are investigating how long the discharge needs to be to destroy all the bacteria and viruses. This technique is not likely to replace the traditional autoclave any time soon, but it opens up the possibility of sterilizing new types of instruments, including devices like detectors and other fancy electronics that would otherwise be damaged by traditional steam-and-heat methods.

Source: American Institute of Physics