SQUELCH TALES

Newsletter from the Merrymeeting Amateur Radio Association for March 2017

444.40 KS1R/R location change filed with NEMSC

As a result of moving the 444.4 repeater from Topsham to Phippsburg, the MARA's KS1R Trustee, Bruce Randall, W1ZE files a relocation notification with the New England Spectrum Management Councils (NESMC) 70cM Coordinator. The request was acknowledged and the KS1R/R Analog & C4FM repeater was placed back into 'Trial' status for six months before a 'Final' coordination can be issued.

If you want to check out the listing for the KS1R repeaters or any other repeater coordinated by the NESMC go to the database at: http://www.nesmc.org/rptr.html ,

All Solid Batteries Show Potential, Challenges Remain

By Kenny Walter - Digital Reporter - @RandDMagazine

All-solid-state batteries could eventually replace the common lithium-ion battery made with liquid electrolytes, enhancing the batteries' energy density and safety.

Researchers from the Massachusetts Institute of Technology have examined the mechanical properties of a sulfide-based solid electrolyte material to determine its mechanical performance when incorporated into batteries. Their findings were published this week in the journal *Advanced Energy Materials.*

The majority of batteries are comprised of two solid, electrochemically active layers called electrodes, separated by a polymer membrane infused with a liquid or gel electrolyte.

While lithium-ion batteries are a lightweight energy-storage solution that has enabled many high-tech devices, substituting the conventional liquid electrolyte with a solid electrolyte could provide an even greater energy storage ability pound for pound at the battery pack level. It may also virtually eliminate the risk of tiny, fingerlike metallic projections called dendrites that can grow through the electrolyte layer and lead to short-circuits.

More advancements are still needed before the battery can be implemented

on an industry level, said study author Krystyn J. Van Vliet, Ph.D, professor of Material Science and Engineering and Biological Engineering at MIT.

"Batteries with components that are all solid are attractive options for performance and safety but several challenges remain," Van Vliet said in a statement.
In the current lithium-ion batteries, the lithium ions pass through a liquid electrolyte to get from one electrode to the other while the battery is being charged, and then flow through in the opposite direction as it is being used.

While the batteries are efficient, the liquid electrolytes tend to be chemically unstable and can even become flammable, while the solid electrolyte could be safer as well as smaller and lighter.

There are questions as to what kind of mechanical stresses may occur in the all-solid batteries within the electrolyte material as the electrodes charge and discharge repeatedly.

The cycling causes the electrodes to swell and contract as the lithium ions pass in and out of their crystal structure.

In a stiff electrolyte the dimensional charges can lead to high stress and if the electrolyte is also brittle the constant changing of dimensions can lead to cracks that rapidly degrade battery performance and could even provide channels for damaging dendrites to form as they do in liquid-electrolyte batteries.

However, if the material is resistant to fracture then those stresses could be accommodated without rapid cracking.

Until now the sulfide's extreme sensitivity to normal lab air made it challenging to measure mechanical properties, including its fracture toughness.

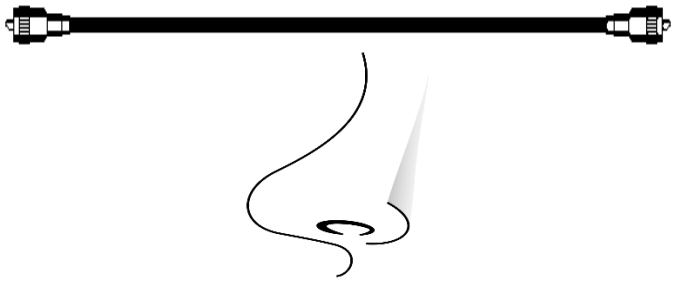
The researchers at MIT were able to conduct the mechanical testing in a bath of mineral oil, which protected the sample from any chemical interactions with air or moisture and enabled the researchers to obtain detailed measurements of the mechanical properties of the lithium-conducting sulfide.

"There are a lot of different candidates for solid electrolytes out there," MIT graduate student Frank McGrogan and study author said in a statement.

Previous researchers have used acoustic measurement techniques, passing sound waves through the material to probe its mechanical behavior, but the method does not quantify the resistance to fracture.
However, in the new study, which used a fine-tipped probe to poke into the material and monitor its responses, gives a more complete picture of the important properties

including hardness, fracture toughness and Young's modulus — a measure of a material's capacity to stretch reversibly under an applied stress.

"Research groups have measured the elastic properties of the sulfide-based solid electrolytes, but not fracture properties," Van Vliet said.



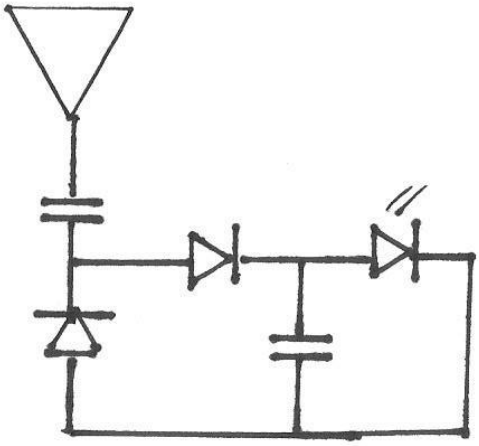
An RF Sniffer made easy

By J.B.Randall, W1ZE

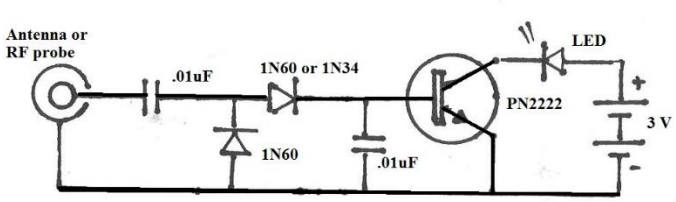
Over the years I have found the need for nifty little test gadgets in the shack or workbench. One I have used often in the shack and in my mobile installations is an RF sniffer. I found it to have various uses such as, detect leaky transmission lines, nearby RF sources and as a simple transmit indicator.

If you Google the Internet for 'RF Sniffer' and/or 'RF Detectors' you will find a lot of DIY (do it yourself) information. I have built several from very simple to moderately complex.

The simplest circuit is made of a sense antenna whip about 20 inches long fed into a couple germanium diodes in a full-wave configuration which converts the RF (ac) to a DC voltage that drives a single LED. It works OK for close in detection but it is not very sensitive.

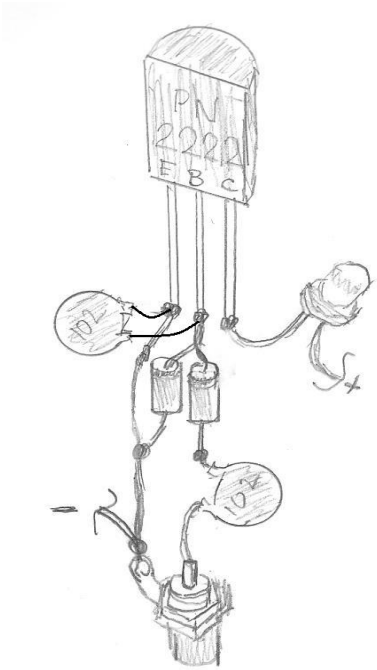


For a step up uses the same RF detection diodes but rather than driving an LED the rectified DC voltage drives a simple NPN transistor which gates an LED that is powered by two AAA batteries (3-volts). This circuit arrangement is much more sensitive and increased useful sniffing of RF.



The two rectifying diodes can be either 1N34s or 1N60s. 1N914 of 1N4147 can also be used if that is all you have. The NPN transistor can be any of the general-purpose type, such as the PN2222, 2N2222, 2N3904, etc. For my sniffer I obtained a

dual AAA battery holder purchased at a local Radio Shack here in Poway. Most of the parts needed to build this little RF Sniffer can be purchased from the Rat-Shack, but if you do not have one of the few remaining stores close to you I found that the parts are easily available through Amazon, eBay, H&R in Portland Maine and others.



I used a BNC connector for the antenna/probe input but a cheaper RCA connector should work fine. The entire circuit including battery holder can fit into a small plastic project box.

I have a 40-inch long telescoping whip with a BNC male connector on it and for the average RF sampling work fine. I also have a 6-inch diameter snoop-loop that is useful for close-in chasing down of RF sources. The sniffer will work fine from below the AM broadcast band and up into the VHF-UHF bands with only a little less sensitivity. It is a fun and easy gadget to build in an evening.

This is Ham Radio so go build something.

73, Bruce, W1ZE