

DOES WOOD AFFECT SOLID BODY ELECTRIC GUITAR PICKUP TONE?

Here is information that all guitar players (*and builders*) will find helpful.

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What's The Buzz?

This is a *seemingly* controversial topic until you understand both the science and mechanics behind it. Sadly, the controversy is fueled by people whose *opinions* aren't grounded in scientific fact. There are two categories of electric guitars; solid body and hollow body. This topic only discusses solid body electric guitars.

Here are the most common "Tonewoods" currently used for electric guitar bodies.

- Agathis
- Alder
- Ash
- Basswood
- Ebony
- Koa
- Korina
- Mahogany
- Maple
- Nato
- Paulownia (*similar to Ash*)
- Poplar
- Rosewood
- Spruce
- Toon
- Walnut
- Wenge

Several wood types are designated as "*endangered species*" and are no longer legally available, so they may not be included in this list.

The notion that a solid body electric guitar made with a specific wood type will have an effect on the tone coming out of an amplifier is preposterous. The scientific physics that govern the operation of copper coil wound magnetic guitar pickups does not support this claim.

These pickups are mounted to the guitar's body under the (steel) strings and surround the strings with a magnetic field. When the strings are "plucked", they vibrate back and forth causing the enveloping magnetic field to also move back and forth following the steel string's vibrations.

This back and forth vibration of the magnetic field "cuts" across the copper coil winding and *induces* a small voltage into the coil. This small voltage is supplied to the amplifier and produces the amplified version of the guitar string vibration.

The electric guitar pickup's output is not influenced by the type of wood to which the pickup is mounted. In fact, if the pickups were simply "suspended" in the air and not mounted to anything, the amplified signal being produced would be identical.

To believe otherwise, you would also have to make the same claim with microphones; that the microphone's output (or *tone*) is influence by whether it is mounted in a metal microphone stand, a wood microphone stand, or just hand held. Because there is no such claim being made in the microphone industry, one has to wonder if a different wood body type will have *any* effect on the output (*i.e.*, "*tone*") produced by the magnetic pickup as a result of vibrating guitar strings. An extensive web search has not produced any scientific evidence to support this claim.

An emerging (*and likely correct*) belief is that some people mistakenly confuse the wood body of a solid body electric guitar **vibrating against their body** with the "tone" coming out of the amplifier. One way to confirm this is to put these passionate adherents in a different room with an amplifier and — while being isolated from the the guitar vibration — listen to the the strings being plucked on the guitar that is in a separate room and have them identify the type of wood body being used. They simply cannot do so when confronted with this scientific "double blind" methodology.

There is also more to this topic of wood vs. tone. One example includes a white paper published in May, 2007 by Keith J. Soper. He wanted to determine if there really is a difference in sound between a Telecaster made of Ash vs Alder. We believe that he obliquely came to the same conclusion. You can read this paper here:

http://www.stormriders.com/guitar/telecaster/guitar_wood.pdf (*open link in new tab*)

There can be agreement that the wood type of a solid body electric guitar will influence "sustain" — albeit slightly. But the term "sustain" is relative and subjective in the context of guitar string vibration. What is needed is to have someone take two identical guitars, everything the same except one with a solid steel body, the other with a "balsa wood-like" low density wood body. This would provide a practical minimum/ maximum density range to measure the output duration of a string plucked on each with identical plucking energy.

Measuring the time that it will take for the output signal of each guitar to degrade to a specific signal intensity will scientifically establish the "time" range for practical sustain of string vibration. We believe that there is not all that much difference in the sustain time between these two body densities.

One more area of "sustain" involves the heavy metal crowd using the amplified output to cause the string(s) to further vibrate —; which is not really sustain, but rather a type of "feedback" that causes the string(s) to continue vibrating. Calling this "sustain" is just muddying the water of scientific analysis even further.

Regarding lighter weight solid body guitars: the Paulownia wood (*similar to Ash*) — a virtual unknown until recently — is very lightweight and is now being used for some guitar bodies. A standard blank Stratocaster body weighs in at about 5.9 lbs. The Paulownia equivalent is around 2 lbs. That's dropping as much as 4 lbs. off the weight of a guitar!

Although repeated removing and replacing screws can more easily cause this wood to have the screws "strip", this issue can be solved by using nylon anchors where the screws would normally go. Having an axe that is several pounds lighter is a heaven-sent solution to all the older rockers who just can't strap on a 12 pound weight for five hours a night.