

Raidho acoustics

# Cutting the Diamond



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We think that our Raidho speakers are beautiful and perform very well. Most leading HiFi experts think so too, when testing and experiencing the speakers and do their best to describe what a Raidho speaker actually can do to your perception of HiFi sound.

So you could ask, why change something that works so well - why take the risk? We guess that is the way we think and work, when there is the slightest possibility that some minor change or adjustment will improve our speakers, we try it out and continuously test, evaluate, rethink, redo and then we ask: can we do it better?



When we came up with the idea to test what the properties of a diamond could do to our speakers, we first had to think where and how. We came up with what we call "Cutting Edge Diamond Technology" - and we have tested this technology for some time with stunning results.

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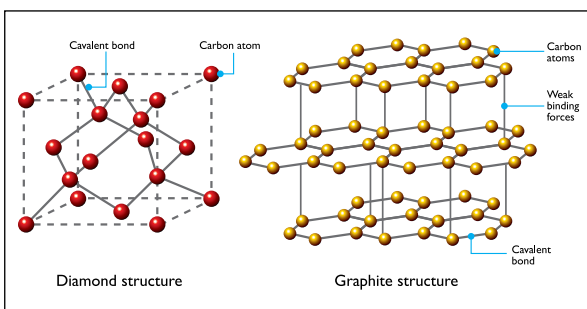
## What is Diamond, and why bother?

During the past 6 years, Raidho has been working with cones from Aluminum-oxide, which, placed at a 9 on the Mohrs scale for hardness, is one of the hardest and stiffest materials. We desired a stiff and hard cone material in order to move the membrane resonances up and away from the pass-band. The ceramic cone from the C 1.1 has a first fundamental at app 12.5 KHz (app 3dB peak), and we use the driver below app 3 KHz where it is crossed over with a 2. order roll-off. This is already in absolute terms an incredible performance!

Then why look further? We guess that it is just the way we are, seeking and wondering what if... Diamond is just a 10 on the Morhs scale. There is not a big difference between nine and ten, however, in reality that one digit translates into a material that is 140 times harder than the ceramic we are currently using. The amount of diamond applied to each cone equals 1.5 carat of pure diamond. Applying the diamond structures has moved the membrane resonance frequency up where we cannot measure. Does it matter? Oh yes, it does! Is it costly? Don't ask...

Diamond is carbon locked in the tightest possible configuration. Natural Diamond is rare and formed under extreme pressure deep, deep down under the ground. Pure diamond is pure crystalline bonded in an SP3 triangular structure, it is totally glass like transparent, and some say even liked by women.

Industrial diamond is formed by a number of different industrialized processes where carbon atoms are forced so close together (by pressure or by speed) that they can form the hard triangular Diamond SP3 bonds.



At Raidho, we work with a process where the pressure to form the diamond bonds is formed by speed, where our ceramic membranes are bombarded by carbon ions, travelling at a speed close to the speed of light. In our process, we can reach around 50% SP3 bonds in the 10 um thick layer we build on top of the ceramic surface that are on our membranes. The rest of the material is SP2 bonded carbon, graphite. We have found that a 50% division between SP2 and SP3 is the optimum point for process ability, the atomic bonding and the improvements in membrane stiffness ratio.



We could process the surface layer into more dense structures with more SP3 and less SP2, but then we would have to reduce the layer thickness and thus get less of the improved stiffness we are searching for. The balance is the internal stresses created in the diamond forming process. If stresses are too high, the result becomes too brittle and as a result the bonding to the substrate delaminates. With just an increase to 60% SP3, we would have to reduce the thickness to 1/5 of what we can achieve now and then lose most of the stiffness gain. The graphite content makes the diamond layer black(ish) in finish.

With the diamond layer, we are capable of improving the stiffness of the cone to an extent where we push the first fundamental resonance outside the 20 KHz pass-band we normally associate with HiFi, this means that the resonance peak (which, by the way, is "only" 3 dB) is damped more than 36 dB by the crossover and the resonance is moved way up in the frequency band where the energy content in the music signal is almost nonexistent. With diamond membranes, we are capable of removing those last bits of material colorations, which emerge from inner material vibrations, completely.

While the C-series already set a solid mark for resolution and naturalness, the D-series just takes you that one step closer. To be honest, we were astonished by the fact that something, you cannot even measure on the finished speaker, could make such a profound difference. It is an entirely new ball game, moving the live sensation of being "there" to a completely new level.

### TRY IT OUT

Please contact us for demonstration

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Now introducing Raidho D-series:  
3 models with Cutting Edge Diamond Technology: D-1, D-2 and D-3