

## Molybdenite and graphene to the helping hand?



The rabbit in "The Last Mimzy" was very special. What material was it made of?

You might have read about Molybdenite a few months ago. It is more efficient than Graphene which is in turn more efficient than good old Silicon, most notable energy-wise. Magazine 'Nature' had an article on it, which is summarised by [Psychorg](#), so check it out. The claim it is 100 000 times more efficient than Silicon (and more efficient than the already [very promising](#) Graphene). This fan-free Silicon-replacer would be a major disaster for the cooling-industry!

But what would change for us? We are now on the edge to move to ARM (started by the smartphone- and tablet-industry), but is all this needed if the energy-costs drop to prices comparable to the costs to keep ice-cream cold on the North-Pole (20 years ago). This technique would give huge potential to Fusion-chips which now have a long way to go, to solve the heat-problem. But since it would take several years (and thus decades in hi-tech years) to get these chips on the market, no assumptions for market-share can be made based on what will happen in a few years.

## Low-power ARM and Molybdenite X86

So this is European ARM (and licensees around the world) vs US Intel and AMD. The sarcastic joke among me and a few friends make, is that the fight of the past 20, 30 years between the economic US and EU is actually about who has the money to hire the most Asians, to develop the revolutionising devices. But as long as the US and EU have the feeling we are actually the equation of the competition as we are a massive 12% of the world-population, I won't be behind the facts too much.

Since batteries don't evolve as fast as processors, the power-problem needed to get slashed differently. A mayor reason for choosing ARM is that it uses less energy than X86, just like LCD/TFT is replaced by e-ink and organic LEDs and memory is non-volatile in portable devices.

In case we get a big reduction for CPU and memory, then the efficiency of the architecture is less of a problem. So then Intel and AMD can re-enter the market again, but then with much more powerful devices. Until then ARM-licensees like NVIDIA and ImTec have a better market if it comes to near-future devices. As I expected more tablet-manufacturers come up with docking-stations to replace the PC with a tablet. AMD and Intel have to keep surprising (and probably protect their market) the coming years to avoid losing from ARM. In other words: the coming years will be exciting how the consumer-market looks like and which companies deal in it. When thinking about these years, keep in mind what Windows XP has thought us: **computers are fast enough for what average Joe wants to do with it.** Hey, I use my laptop for OpenCL and the big screen, for the rest I use my mobile phone.

## Hybrid chips

While I did not see it as a serious problem last year, the heat-problem for a GPU+CPU on one chip is quite a challenge. Waiting for

the Molybdenite or Graphene chips to mature will be like digging your own grave. Each step forward will result in two new products: one which is more power and/or heat efficient, and one which is more powerful. Since the competition from ARM-companies is heavy, the chances that the focus will be on more powerful Hybrid CPUs is bigger. As I stated above the losses are in the low-power area. Intel and AMD are very aware of this challenge.

Have you checked the differences between DirectX 10 and 11 games? Just check the discussions on the growing side of not needing to support DirectX 11, because 10 is good enough. Also here, the demand is higher to have the same graphics-quality for less money on more portable devices. Hybrid CPUs will eat the GPU-market for sure.

ARM-processors are hybrid processors. That's all I tell, so you can -in combination with all stated above- formulate your own conclusions. I was very surprised NVIDIA started targeting ARM with their high-end GPUs, but was this a real bad idea?

## Device vs Data-centre

Reduction of energy-costs for processors will reduce the head-less servers in the data-centre enormously. Internet costs loads of energy, both the transport and the servers - this will reduce the server-part of energy-consumption-sum with quite some factors. All positive news.

But if it all this becomes true, that chips don't use much energy anymore and actually mobile internet and other radios take the most, what will happen to the cloud? Will you upload your video to get it processed or put your mobile in the sun to charge it while waiting a shorter period?

## Current developments, future needs

We need arithmetic, media-processing and input/output; we all have that. We need long battery-life, a good screen and a fast way to input our data and commands; we get more of that each day. But heat-production is Silicon limits a lot, so we get the perfect electronic device the moment we can replace Silicon. Getting rid of the heat could give us square chips, with challenges like reinventing the socket and multi-multi-layeriness.

So the question to you: is in [The Last Nimzy](#) sequel (you know, the movie with the molybdenite rabbit) a logo of Intel, AMD, ARM or another company found?