RESPONSE TO REVIEWERS

We are extremely pleased that our proposal received such strong and enthusiastic support. Three of the referees rated the proposal as a 6 with a high confidence level in each case, and clearly put a great deal of time and effort into writing substantial and well-informed reports (for which we are, of course, very grateful). They highlight the “obvious adventure and ambition” and “transformative potential” [Reviewer 039742539] of the proposal, describing it as “scientifically very strong, extremely adventurous…ambitious…exciting” [Reviewer 131681883] and “extremely novel…very timely” with “a high degree of innovation” [Referee 159085901].

Moreover, it is particularly pleasing that our somewhat unorthodox Pathways To Impact case (described by Referee 076873847 as “certainly not the usual impact statement”) was particularly well-received by three of the referees. (We address the concerns of the dissenting referee (076873847) below). The Pathways To Impact case is variously described as “highly creative and attractive” with “huge potential impact” [039742539], “an extremely strong outreach plan” [131681883], and as constituting “a real difference…a significant advantage with respect to more traditional but, at the same time, less effective…dissemination avenues” [159085901].

In the following we address the comments of each of the referees in turn, paying particular attention to the criticisms of Reviewer 076873847.

Reviewer 039742539. This referee closes their review of the proposal with “I can’t find anything negative to say”. It’s worth noting that their comments regarding impact run counter to those of 076873847.

Reviewer 131681883. This is another entirely positive report. There are no criticisms to address.

Reviewer 159085901. We were particularly pleased to read that this reviewer considered our proposal to be “an almost prototypical example of a highly adventurous and speculative proposal at the vanguard of a very interesting research field”. The reviewer raises a couple of perceptive questions which we can address in a very straightforward way:

(i) (Under “Quality”). Is the overall stability of the scanning probe microscope at elevated temperatures an issue? This is a good point. The reviewer is entirely correct to state that operation at elevated temperatures (i.e. above 77 K) is rather more challenging that at 77 K or at 5 K. However, for the last few years we have been using an atom-tracking unit for both imaging and spectroscopy (developed by Philipp Rahe, currently a Marie Curie Fellow in the Nottingham group). This effectively eliminates thermal drift, even -- and particularly -- at elevated temperatures. There remains the question of addressing thermal gradients when the sample stage is counter-heated on our low temperature system but, while challenging, this is far from an insurmountable problem (particularly with atom-tracking in place).
(ii) (Again under “Quality”). Should we attempt “deterministic epitaxy” for silicon first? We are already funded by the European Commission to explore atom manipulation on silicon surfaces using DFM. The results of those experiments will certainly inform our approach to 3D manipulation on III-V surfaces but they are two very distinct systems (for the reasons outlined in the proposal).

(iii) (Under “Impact”). The referee makes a good point in that we should have spent a little more time explaining the use of social media (although space was very limited in the two page Pathways… statement). We plan to use a combination of blogs and YouTube videos, coupled with updates and links to those platforms via Twitter, to provide a “real-time” insight into the progression of the project. This type of “warts and all” insight into real science is typically lacking from the vast majority of science communication (a number of Brady Haran’s videos being notable exceptions). We are keen to remove the “gloss” that is too often a feature of press releases, science programmes (“Horizon” etc…), and media presentation of research in general, and show the highs and lows of day-to-day science.

Reviewer 076873847. Although this referee is broadly supportive of the proposed research, is confident that we have a strong track record and will successfully ‘deliver’ (under Overall Assessment they explicitly state: “I have no doubt that if this proposal is funded the PI and Co-I† will carry out excellent and ground-breaking work”), and they feel that the requested resources and approach to management are entirely appropriate, we must admit to being somewhat perplexed by a number of their statements. Their “4” rating appears to be based on two misconceptions which are very easily addressed:

(i) The role of Dr. Samuel Jarvis’ Leverhulme Trust fellowship. The referee’s view on the staff costs diverges considerably from that of the other reviewers. (Interestingly, however, state in the “Resources and Management” section that the proposal “includes all the relevant resources, and justification is given for these”). The Leverhulme Trust fellowship, while having DFM as its core technique, is focussed on an entirely different materials system – molecules on metals -- and, indeed, on an entirely different instrument in the Nottingham group. Contrary to the referee’s understanding, the issue of workload has therefore not been addressed by the award of the Leverhulme Fellowship. Sam Jarvis will effectively act as a consultant for our proposed project (free of charge to EPSRC).

(ii) The reviewer provides no critique at all of our Pathways To Impact case other than to state that it is unusual. They then go on to criticise, in the Overall Assessment section, the concept of including dissemination activities within a scientific research proposal. However, the referee is making a criticism not of our impact case but of EPSRC’s (and, more generally, RCUK’s) requirement for a Pathways To Impact statement. This is entirely outside of our control. (As someone who has been rather a critic of the RCUK impact “agenda”, the irony here is not lost on the PI!)

The reviewer finishes by stating that the proposal does not “adequately describe enough of the science” but fails to back up this assertion with concrete examples of where the description of the science is lacking. Moreover, their comment is entirely out of kilter with those of the other referees regarding the quality, ambition, and excitement of the science.

† Note that there are two Co-Is.