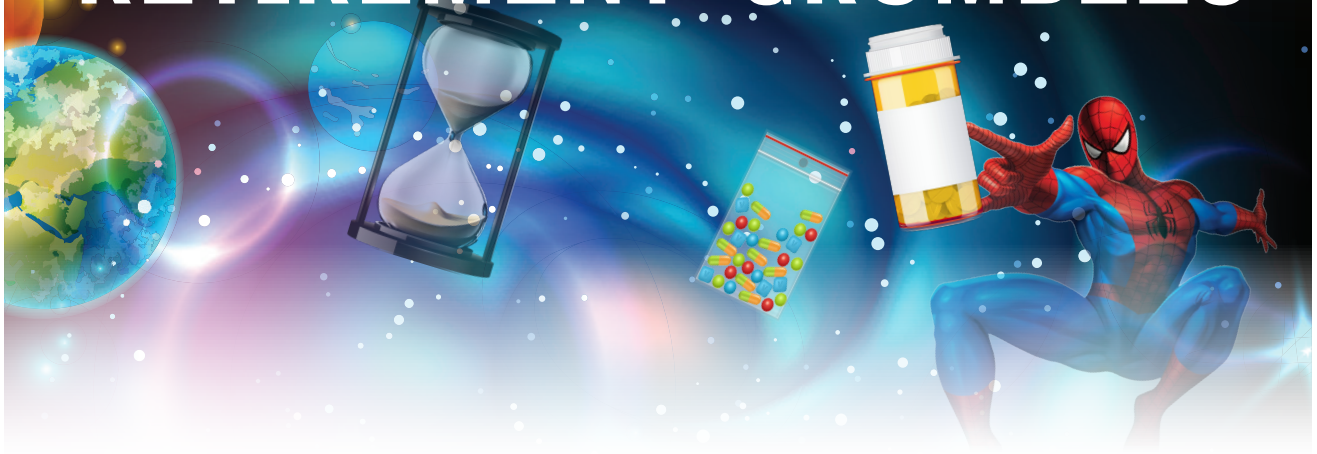




RETIREMENT GRUMBLES



As I write this, I have just returned from the MRS Fall Meeting in Boston, and I find myself thinking about and eagerly waiting for the MRS Spring Meeting in Phoenix in April. Who will I meet there? What will I learn from attending? What new opportunities and connections will come about because of attendance? I don't want to say that I'm impatient. I don't want to, but I am.

It is said that patience is a virtue. And maybe it is, under some circumstances. But I've never been very patient. I am a speed-reader. I wait six months or more for new books from my favorite authors, only to read them quickly (often in less than a day), and then have to wait another six months or longer for the next book. Books in a series often end in cliffhangers, so I am left wondering for months what will happen to my favorite characters. The same is true for television shows and movies that I enjoy. It also applies to recurring events. To validate my sanity, I note that this sort of impatience does not occur with bill-paying or other odious activities. Additional grumbles are as follows.

One of the biggest disappointments to me has been the slow pace of humankind's space exploration programs. I've been a supporter of the space program, particularly humans in space, for decades. One of the reasons that I became a scientist was because of my fascination with the space programs of the early 1960s. Astronauts and cosmonauts who bravely participated in these efforts inspired many of us. I remember watching the first moon landing in 1969. At that point in the Apollo program, I assumed that travel to the moon would become routine, and by now, we would have huge space stations with dozens to hundreds of people on board each, colonies on the moon, and maybe even on Mars. The retreat from all of that has been painful to experience.

It was during the early 1960s that I also began to be interested in science fiction. These novels also piqued my interest in the space program and humans in space. One of the first novels that I read was *Red Planet*.¹ Of course, the fictional Mars planet in this Heinlein novel was significantly different from what we currently know of Mars. And yet, many of us are still intrigued by Mars and would like to see human exploration of and human colonies on Mars.² There has been significant progress in materials and

technologies for space systems since those early days of space travel, but we still need better materials to enable long duration space travel by humans.

I'm also impatient for better forms of air travel. I am a white-knuckle flier. Nonetheless, I (like most of you) have experienced (suffered through) thousands of hours in the air, traveling for business or for pleasure. Air travel is one of the safest modes of transportation.³ Intellectually, I'm aware of this fact. Nonetheless, time in the air usually includes moments of sheer terror as the plane is tossed around by atmospheric forces. Transoceanic flights and even coast-to-coast flights are lengthy and not the most comfortable of events, even if you are flying first class.

I remember returning from a MRS Fall Meeting in Boston back to Los Angeles many years ago on such a flight. It was scheduled to be just more than six hours in length. Six hours came and went with no landing announcement, then six and a half hours, and then seven hours. Finally, the captain came on the intercom and said that the plane had been delayed by extreme headwinds. He indicated that although he thought we had enough fuel to travel to Los Angeles, we were landing in Las Vegas to be safe. Flights like that make me yearn for reliable supersonic transports (SSTs) or even suborbital space transport. SSTs would reduce flight times by more than half on long flights, and suborbital transport could cover half of the world in less than an hour. Commercial supersonic aircraft have all but vanished because they have proven uneconomical, have safety issues, and because of the sonic boom associated with such travel.^{4,5} Lightweight and strong materials would enable safe, reliable, and cost-effective operation of the vehicle and allow aircraft designs that would mitigate the noise pollution problem.

I'm also impatient for better personal computers and software, up to and including computers hosting artificial intelligence (AI). When I think of all of the tasks that such a computer could handle for us in our personal lives, it makes me want one now. I know that we've recently seen warnings⁶ that AI is inherently dangerous to humanity, and I acknowledge that those are serious concerns. Nonetheless, I believe that researchers involved in developing AI can figure out methods to mitigate those dangers.



As I get older, I find myself taking more medications. Most medications are accompanied by a pamphlet giving details of the product as well as potential side effects of using it. Side effects typically range from merely unpleasant to life-threatening.⁷ Just once, I'd like to receive a medication with beneficial side effects, such as "increases metabolism, strengthens muscles, improves visual function and hearing, increases skin and other organ health, grows a full head of hair, and increases libido and happiness." Those of you involved in R&D of new pharmaceutical materials need to help us out.

It occurs to me that some of you reading these complaints will characterize me as a curmudgeon.⁸ Ouch! Really, I do grumble. I'm occasionally grumpy and sometimes angry about things. But I'm not nearly as curmudgeonly as other MRS members that I could name, but won't.

I will raise two final issues in this Posterminaries article. The first involves the amazing Stan Lee,⁹ who was the creative force behind the universes populated with Marvel comics characters—both heroes and villains. Lee passed away on November 12, 2018. The Marvel universe, populated with more than 7000 characters,¹⁰ is a marvelous (pun fully intended) blend of science fiction and science fantasy.^{11,12} Feats of derring-do are enabled by advanced materials and technologies that are not (yet) found in the real world. I have been reading both DC and Marvel comics since the 1960s. I also enjoy the movies. [Spoiler alert!] Although, what the heck were they thinking in *Avengers: Infinity War*, in which most of the heroes died? I have yet to fathom.¹³ I can only assume/hope that the fallen will be marvelously (pun fully intended) resurrected in future movies. In any case, in memory of Stan Lee, I say "Excelsior!"

Finally, during the recent MRS Fall Meeting, my friend and colleague Bill Hammetter reminded some of us that 2023 is the 50th anniversary of the founding of the Materials Research Society.

I am sure that the powers that be within MRS have begun to think about appropriate approaches to celebrate the event and to honor the founders and others who made notable contributions to materials research during the formative years of the Society. One of Bill's laments was that we have already lost some of those extraordinary people, and that we should do something to capture the histories of those that remain, particularly in regards to materials research and their involvement with MRS, before they too pass away.

In any case, I'm really looking forward to attending the 2019 MRS Spring Meeting. Maybe I'll find that materials researchers have already solved some of the problems that I've discussed herein.

Steve Moss

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